General Description

- Qualified according to AQG324，release no：03.1/2021
- The Module with SiC MOSFET is a very compact six-pack module
- It's designed for the high frequency applications such as On-Board Charger

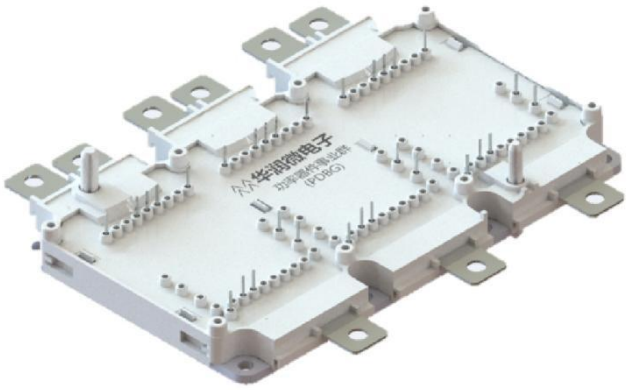
Features：

- Electrical features
  - V_{DSS} = 1200V
  - I_{DN} = 600A
  - New semiconductor material - silicon cadbide
  - Low $R_{DS\ on}$
  - Low Q_g and C_{rss}
  - Low inductive design
  - Low switching losses
  - $T_{vj\ op}$ = 175℃
  - Short-time extended operation temperature $T_{vj\ op}$ = 200℃
- Mechanical features
  - 4.2 kV DC 1 second insulation
  - High creepage and clearance distances
  - High power density
  - Direct-cooled PinFin base plate
  - High-performance Si_3N_4 ceramic
  - Guiding elements for PCB and cooler assembly
  - Integrated temperature sensing diode
  - PressFIT contact technology
  - RoHS compliant, lead-free
  - UL 94 V0 module frame

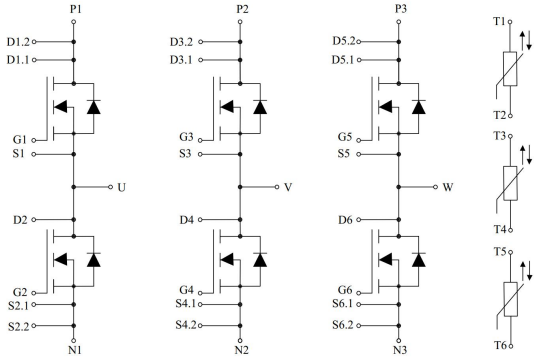
Potential Applications：

- Automotive applications
- (Hybrid) electrical vehicles (H)EV
- Motor drives
- Commercial, construction and agricultural vehicles (CAV)

Product Appearance：



Topology Diagram：



Package Marking and Ordering Information：

Part #	Marking	Package	Packing	Qty
CRXMW600P120PDG4AQ	CRXMW600P120PDG4AQ	Three-Phase full-bridge	BOX	6

封装 / Package

Module / Characteristic Values

绝缘测试电压 Isolation test voltage	RMS , f = 0 Hz , t = 1 S.	V_{ISOL}	4.2	kV
模块基板材料 Material of module baseplate			Ni+Cu[1)]	
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) Basic insulation (class1, IEC 61140)		Si3N4	
爬电距离 Creepage distance	端子到散热器/terminal to heatsink 端子到端子/terminal to terminal	d_{Creep}	9.0 9.0	mm
电气距离 Clearance	端子到散热器/terminal to heatsink 端子到端子/terminal to terminal	d_{Clear}	4.5 4.5	mm
相对漏电起痕指数 Comparative tracking index		CTI	>200	

1）Ni plated Cu baseplate

			min.	typ.	max.	
模块杂散电感 Stray inductance module		L_{sDS}		8.5		nH
模块引脚电阻，端子-芯片 Module lead resistance, terminals-chip	T_C=25° C,每个开关/per switch	$R_{CC'+EE'}$		0.75		mΩ
储存温度 Storage temperature		T_{stg}	-40		125	°C
工作结温 Operating junction temperature		T_j			175	°C
模块安装扭矩 Mounting torque for module mounting	Screw M4 baseplate to heatsink Screw EJOT Delta PCB to frame	M	1.8 0.45	2.0 0.50	2.2 0.55	Nm
质量 Weight		G		689		g

			min.	typ.	max.	
焊接温度 Heat-staking dome temperature	$T_{staking}$ < 10s	T_{HS}			280	°C

MOSFET

最大额定值 / Maximum Rated Values

漏-源极电压 Drain-Source voltage	T_{vj} = 25℃	V_{DSS}	1200	V
连续漏极电流 Continuous DC drain current	V_{GS} = 18V , T_f = 65℃, $T_{vj\,max}$ = 175℃	$I_{D\,nom}$	600	A
漏极脉冲电流 Pulsed drain current	Verified by design , t_p limited by $T_{vj\,max}$	$I_{D\,pulse}$	1200	A
额定栅-源极电压 Gate- Source voltage(static)		V_{GS}	-5/+18V	V
瞬态栅-源极电压 Gate- Source voltage(dynamic)	Duty Cycle < 1 % (first transient maximum peak)	V_{GS}	-10/+22	V

特征值 / Characteristic Values

				min.	typ.	max.	
漏-源极导通电阻 Drain-source on-resistance	I_D = 600A, V_{GS} = 18V I_D = 600A, V_{GS} = 18V I_D = 600A, V_{GS} = 18V	T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	$R_{DS\,on}$		2.2 3.1 3.9		mΩ
漏-源极导通电阻 Drain-source on-resistance	I_D = 600A, V_{GS} = 15V I_D = 600A, V_{GS} = 15V I_D = 600A, V_{GS} = 15V	T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	$R_{DS\,on}$		2.8 3.5 4.3		mΩ
栅极阈值电压 Gate threshold voltage	I_D = 150 mA, V_{DS} = V_{GS}, T_{vj} = 25℃		V_{GSth}		3.02		V
栅极电荷 Gate charge	V_{GS} = -5/18V, V_{DS}=750V		Q_G		1.24		uC
栅极内阻 Internal Gate resistor	f = 1MHz, T_{vj} = 25℃		R_{Gint}		2.03		Ω
输入电容 Input capacitance	f = 1MHz, T_{vj} = 25℃, V_{DS} = 800V, V_{GS} = 0V		C_{iss}		28.0		nF
输出电容 Output capacitance	f = 1MHz, T_{vj} = 25℃, V_{DS} = 800V, V_{GS} = 0V		C_{oss}		1.38		nF
反向传输电容 Reverse transfer capacitance	f = 1MHz, T_{vj} = 25℃, V_{DS} = 800V, V_{GS} = 0V		C_{rss}		0.05		nF
漏-源极漏电流 Drain-source leakage current	V_{GS} = 0V, V_{DS} = 1200V	T_{vj} = 25℃	I_{DSS}			100	uA
栅-源极漏电流 Gate-source leakage current	V_{GS} = 20V, V_{DS} = 0V	T_{vj} = 25℃	I_{GSS}			400	nA
开通延迟时间 Turn-on delay time	V_{DS} = 750 V, I_D = 600 A Ls = 32 nH V_{GS} = -5 V to +18 V R_{Gon} = 2Ω , R_{Goff} = 15Ω T_{vj} = 25℃ : on_di/dt = 11.7A/ns off_dv/dt = 8.7V/ns T_{vj} = 125℃ : on_di/dt = 12.2 A/ns off_dv/dt = 10.42 V/ns T_{vj} = 175℃ : on_di/dt = 12.61 A/ns off_dv/dt = 11.23V/ns	T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	$t_{d\,on}$		59.2 49.9 47.52		ns ns ns
上升时间 Rise Time		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	t_r		43.2 39.2 37.9		ns ns ns
关断延迟时间 Turn-Off Delay Time		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	$t_{d\,off}$		508 620 668		ns ns ns
下降时间 Fall Time		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	t_f		142 154 156		ns ns ns
开通损耗能量 Turn-on energy loss		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	E_{on}		7.2 6.2 5.7		mJ mJ mJ
关断损耗能量 Turn-off energy loss		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	E_{off}		52.5 54.8 55.8		mJ mJ mJ
总开关损耗 Total switch energy loss		T_{vj} = 25℃ T_{vj} = 125℃ T_{vj} = 175℃	E_{ts}		59.7 61.0 61.5		mJ mJ mJ

短路参数 SC data	$V_{GE} \leq 18$ V, $V_{CC} = 750$ V, $t_P \leq 1.9$us, $T_{vj} = 175°C$	I_{SC}		6389		A
结—外壳热阻 Thermal resistance, junction to cooling fluid	per MOSFET, 50% water / 50% ethylenglycol, $\Delta V/\Delta t = 10$ dm³/min, $T_f = 60$ ℃	R_{thJF}		0.13	0.14[1)]	K/W
在开关状态下温度 Temperature under switching conditions	Continuous operation	$T_{vj\,op}$	-40		175	℃
	Extended operation				200[2)]	℃

1) Verified by characterization , not by testing
2) For 100h cumulated over life time.

Body Diode（MOSFET）

最大额定值 / Maximum Rated Values

漏-源极电压 Drain-Source voltage	$T_{vj} = 25°C$	V_{DSS}		1200	V
体二极管正向电流 DC body diode forward current	$V_{GS} = -5V$, $T_f = 65℃$, $T_{vj\,max} = 175℃$	I_{FS}		600	A
二极管脉冲正向电流 Pulsed body diode current	verified by design, tp limited by $T_{vj\,max}$	$I_{FS,pulse}$		1200	A

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_{FS} = 600A$, $V_{GS} = 0V$ $I_{FS} = 600A$, $V_{GS} = 0V$ $I_{FS} = 600A$, $V_{GS} = 0V$	$T_{vj} = 25℃$ $T_{vj} = 125℃$ $T_{vj} = 175℃$	V_{FSD}		4.37 4.53 4.71		V V V
反向恢复峰值电流 Peak reverse recovery current	$I_{FS} = 600A$, $V_{RDS} = 750$ V $V_{GS} = -5$ V	$T_{vj} = 25℃$ $T_{vj} = 125℃$ $T_{vj} = 175℃$	I_{RM}		141 242 357		A A A
反向恢复时间 Reverse recovery time	$T_{vj} = 25℃$: -di/dt =10.76 A/ns	$T_{vj} = 25℃$ $T_{vj} = 125℃$ $T_{vj} = 175℃$	t_{rr}		21.9 32.5 42.6		ns ns ns
恢复电荷 Recovered charge	$T_{vj} = 125℃$: -di/dt = 11.78 A/ns	$T_{vj} = 25℃$ $T_{vj} = 125℃$ $T_{vj} = 175℃$	Q_{rr}		1.74 5.23 9.61		uC uC uC
反向恢复损耗 Reverse recovery energy	$T_{vj} = 175℃$: -di/dt = 14.89 A/ns	$T_{vj} = 25℃$ $T_{vj} = 125℃$ $T_{vj} = 175℃$	E_{rec}		0.93 3.05 5.92		mJ mJ mJ

NTC 电阻 / NTC resistor

NTC / Characteristic Values

				min.	typ.	max.	
典型阻值 Rated resistance	$T_{NTC} = 25℃$	R_{25}			5		KΩ
误差 Tolerance	$T_{NTC} = 25℃$	$\Delta R/R$		-3		3	%
功率 Power Dissipation	$T_{NTC} = 25℃$	P_D			60		mW
B 值 B-Value	$B_{T1/T2} = \frac{T2 \times T1}{T2 - T1} \times \ln \frac{R1}{R2}$	$B_{25/50}$			3375		K
B 值 B-Value	$B_{T1/T2} = \frac{T2 \times T1}{T2 - T1} \times \ln \frac{R1}{R2}$	$B_{25/100}$			3443		K

Typical Performance Characteristics

图 1. 输出特性(典型)，MOSFET
Output characteristic (typical)，MOSFET
$I_D = f(V_{DS})$，$V_{GS} = 18$ V

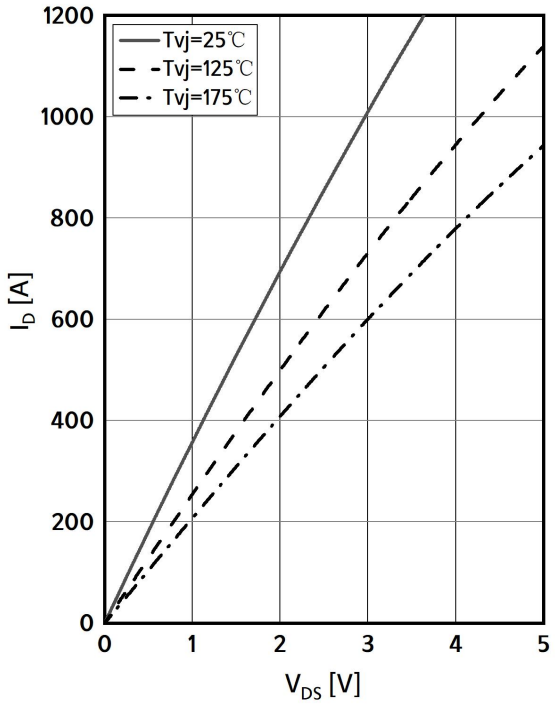


图 2. 输出特性(典型)，MOSFET
Output characteristic (typical)，MOSFET
$I_D = f(V_{DS})$，$V_{GS} = 15$ V

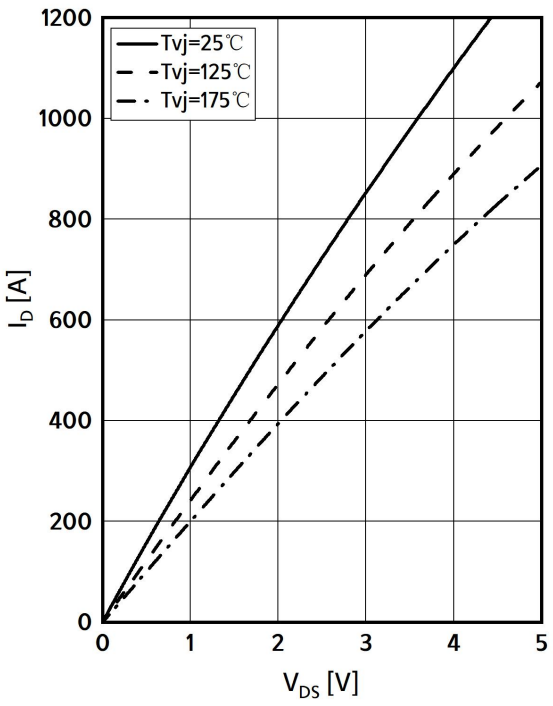


图 3. 输出特性(典型)，MOSFET
Output characteristic (typical)，MOSFET
$I_D = f(V_{DS})$，$T_{vj} = 25$℃

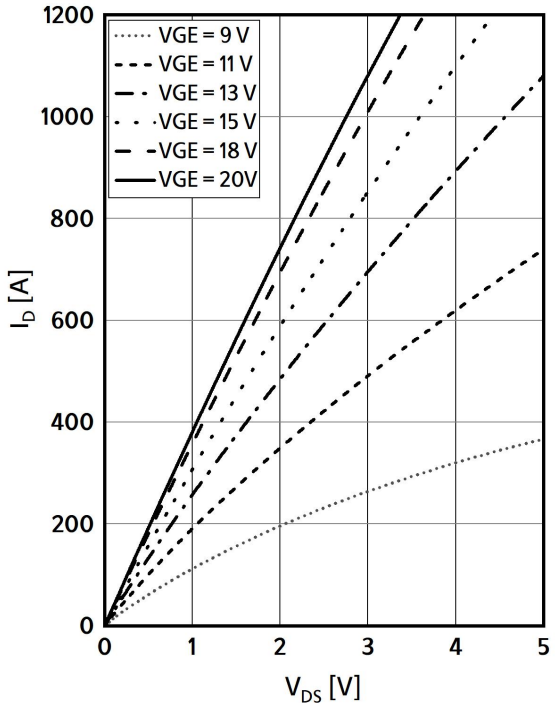


图 4. 漏源导通电阻(典型)，MOSFET
Drain-source on-resistance (typical)，MOSFET
$R_{DS\,on} = f(I_D)$，$V_{GS} = 18$V

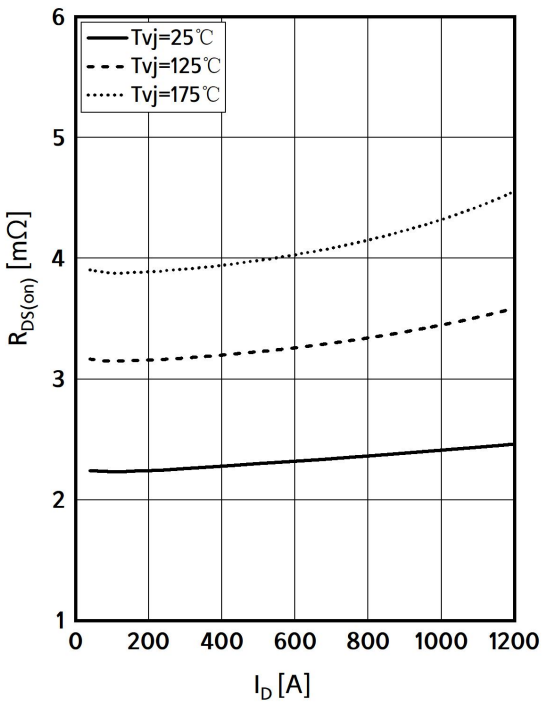


图 5. 漏源导通电阻(典型)，MOSFET
Drain-source on-resistance (typical) , MOSFET
$R_{DS\,on} = f(T_{vj})$，$I_D = 600A$

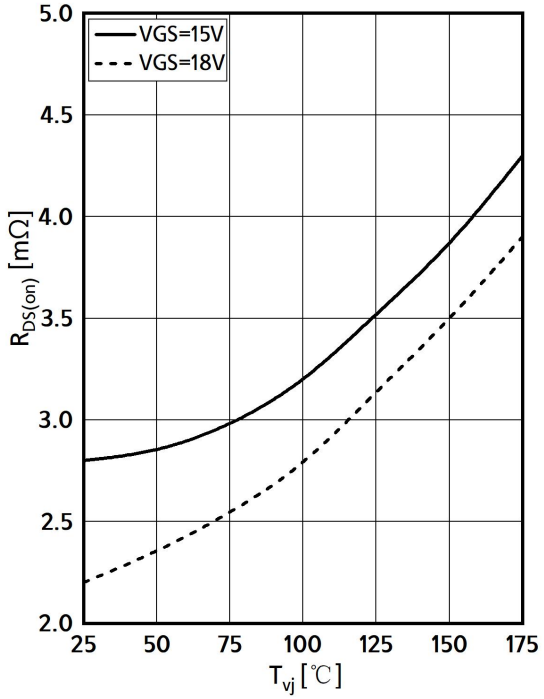


图 6. 栅-源阈值电压(典型)，MOSFET
Gate-source threshold voltage (typical) , MOSFET
$V_{GS(th)} = f(T_{vj})$，$V_{GS} = V_{DS}$

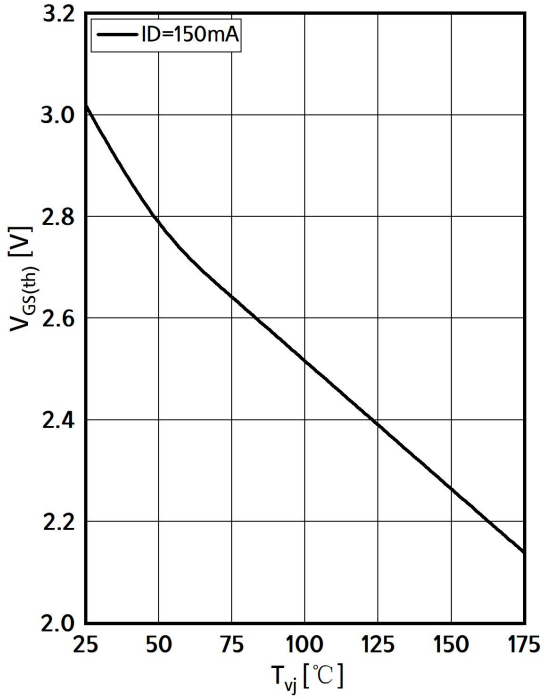


图 7. 栅极电荷特性(典型)，MOSFET
Gate charge characteristic (typical) , MOSFET
$V_{GS} = f(Q_G)$，$I_D = 600A$、$T_{vj} = 25℃$

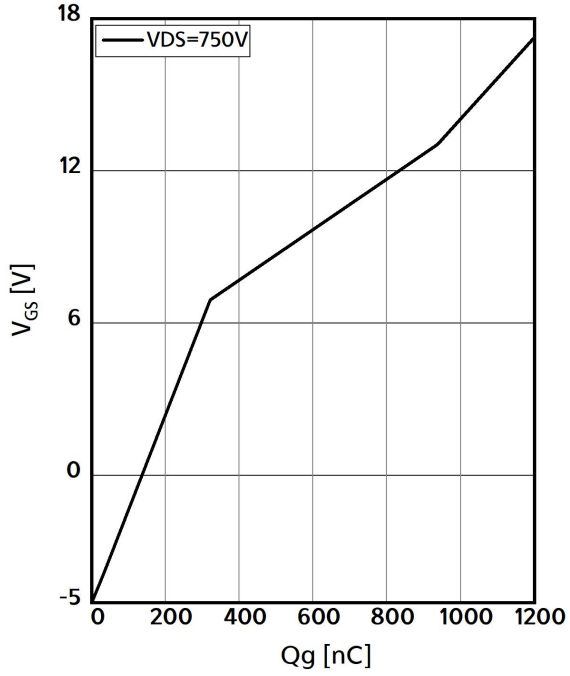


图 8. 结电容特性(典型)，MOSFET
Capacity characteristic (typical) , MOSFET
$C = f(V_{DS})$
$f = 100KHz$，$V_{GS} = 0V$，$T_{vj} = 25℃$

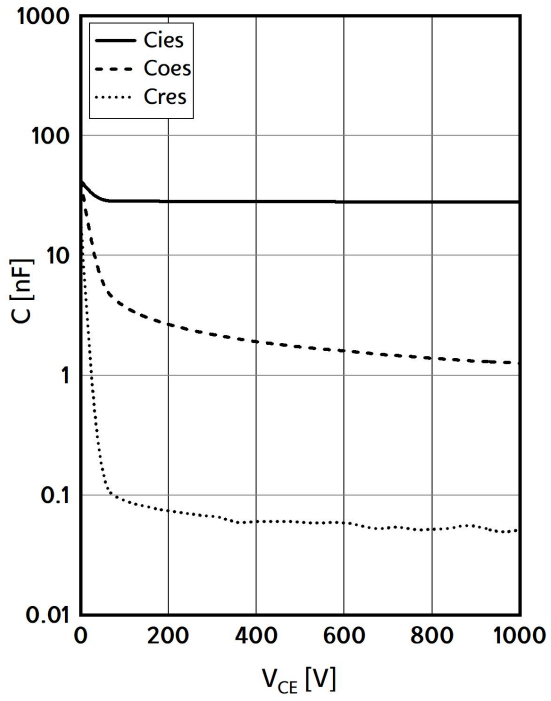


图 9. 开关损耗 SIC，逆变器（典型）
Switching losses SIC, Inverter (typical)
$E_{on} = f(I_D)$
V_{GS} = -5 V to 18 V, R_{Gon} = 2Ω, R_{Goff} = 15 Ω, V_{DS} =750 V

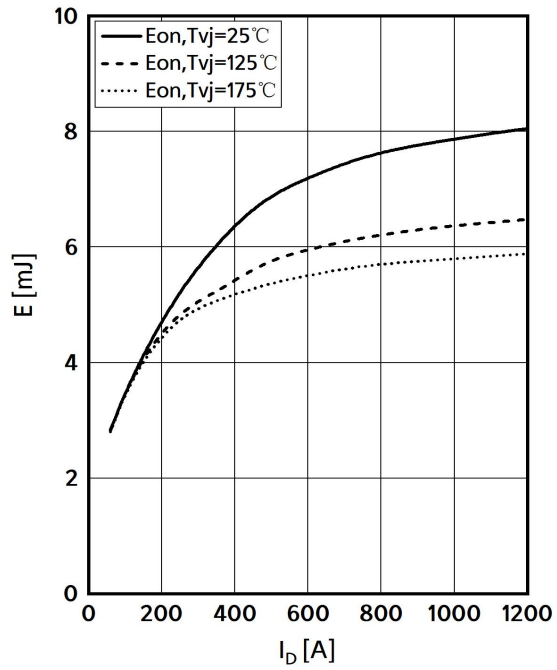


图 10. 开关损耗 SIC，逆变器（典型）
Switching losses SIC, Inverter (typical)
$E_{off} = f(I_D)$
V_{GS} = -5 V to 18 V, R_{Gon} = 2Ω, R_{Goff} = 15 Ω, V_{DS} =750 V

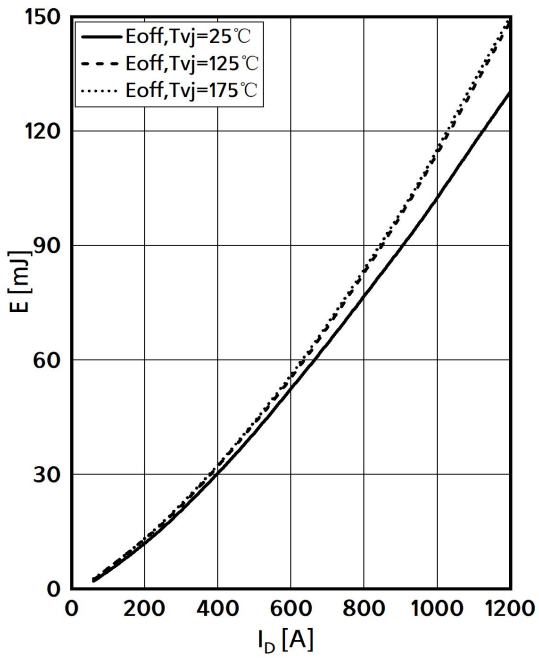


图 11. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
$t_{d\,on} = f(I_D)$
V_{GS} = -5V to 18V, R_{Gon} = 2Ω, R_{Goff} = 15Ω, V_{DS} = 750 V

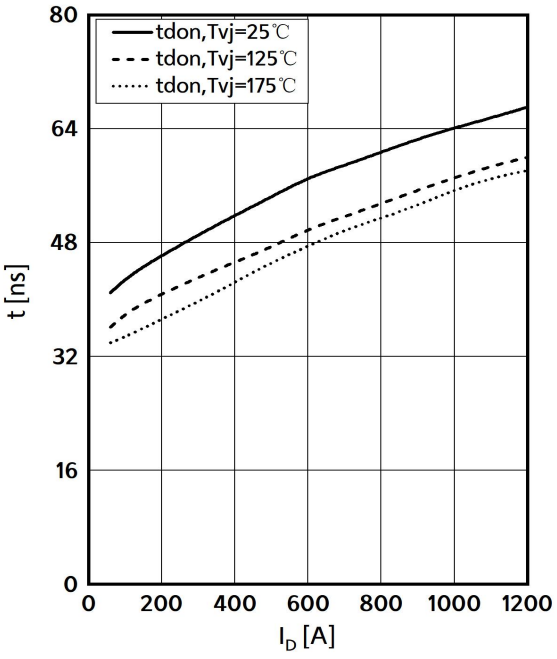


图 12. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
$t_r = f(I_D)$
V_{GS} = -5V to 18V, R_{Gon} = 2Ω, R_{Goff} = 15Ω, V_{DS} = 750 V

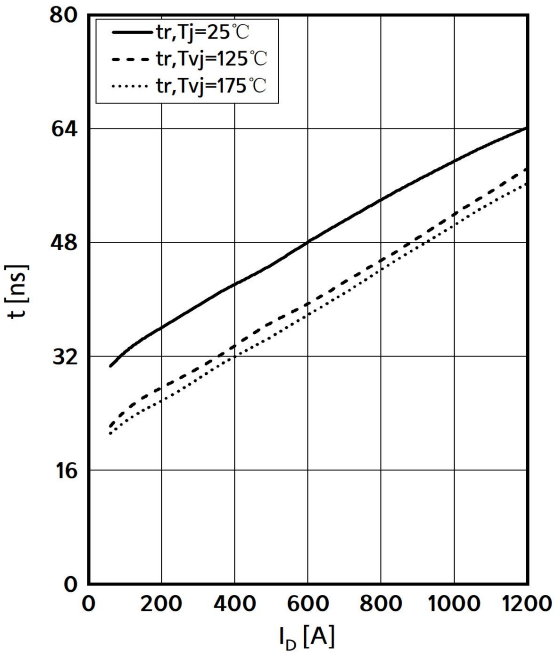


图 13. 关断特性 SIC，逆变器（典型）
Turn-off Characteristics SIC, Inverter (typical)
$t_{d\,off} = f(I_D)$
V_{GS} = -5 V to 158V, R_{Gon} = 2 Ω, R_{Goff} =15Ω, V_{DS} = 750 V

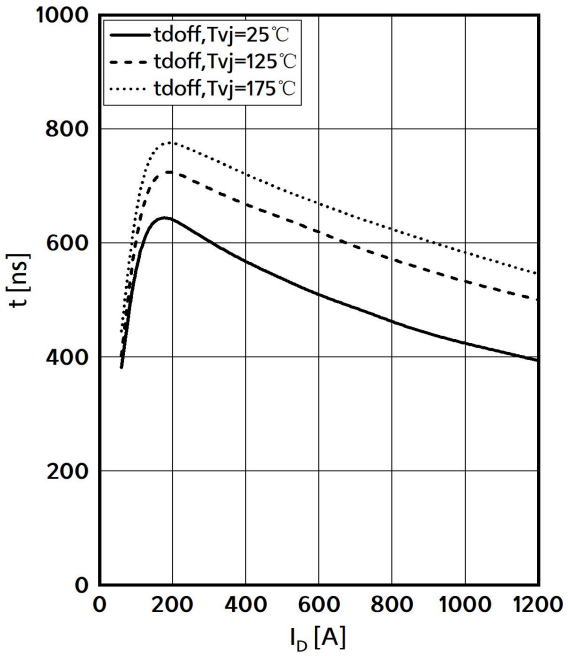


图 14. 关断特性 SIC，逆变器（典型）
Turn-off Characteristics SIC, Inverter (typical)
$t_f = f(I_D)$
V_{GS} = -5 V to 158V, R_{Gon} = 2 Ω, R_{Goff} =15Ω, V_{DS} = 750 V

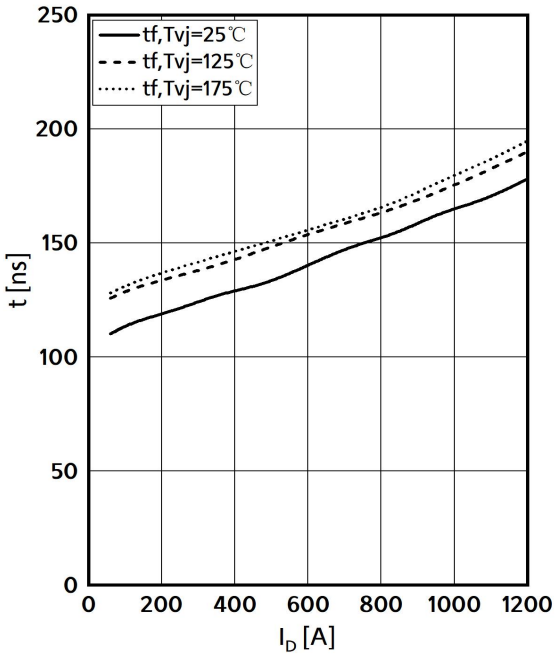


图 15.开关损耗 SIC，逆变器（典型）
Switching losses SIC, Inverter (typical)
$E_{on} = f(R_G)$
V_{GS} = -5V to 18V, I_D = 600 A, V_{DS} =750V

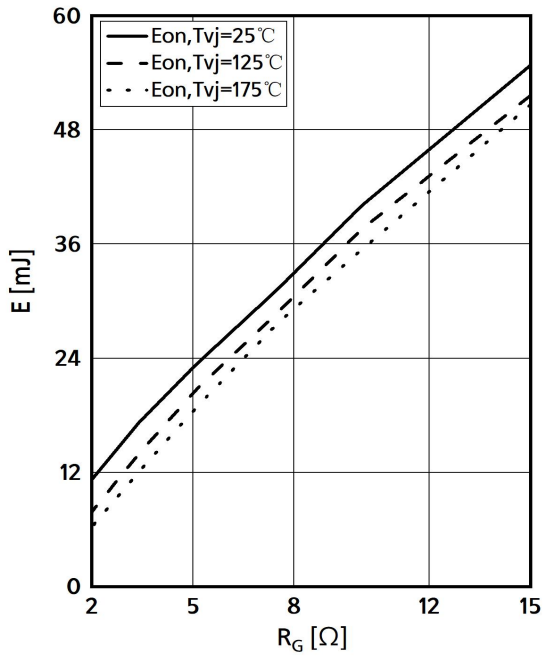


图 16.开关损耗 SIC，逆变器（典型）
Switching losses SIC, Inverter (typical)
$E_{off} = f(R_G)$
V_{GS} = -5V to 18V, I_D = 600 A, V_{DS} =750V

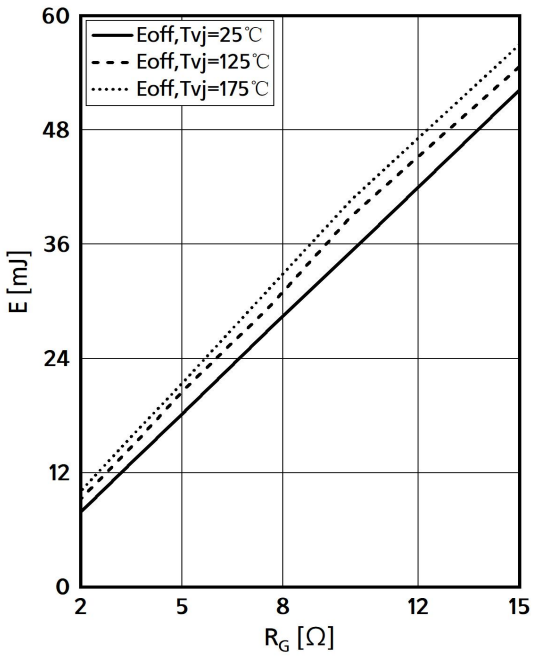


图 17. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
$t_{d\,on}$ =f (RG)
V_{GS} = -8V to 15 V, ID= 600 A, V_{DS} = 750 V

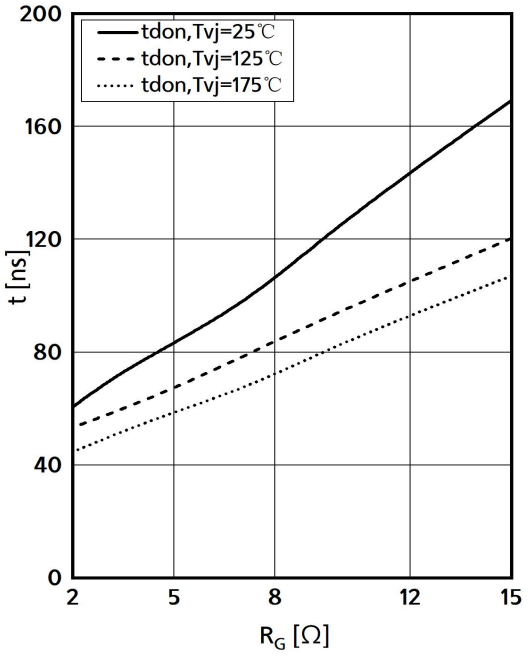


图 18. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
t_r= f (RG)
V_{GS} = -8V to 15 V, ID= 600 A, V_{DS} = 750 V

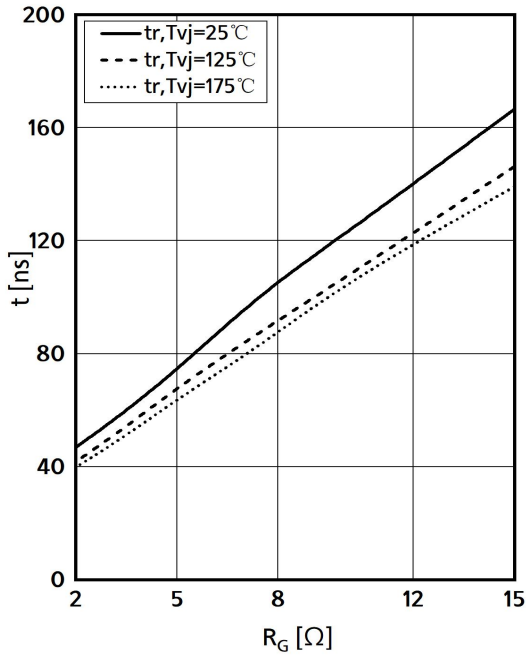


图 19. 关断特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
$t_{d\,off}$= f (RG)
V_{GS} = -8V to 15 V, ID= 600 A, V_{DS} = 750 V

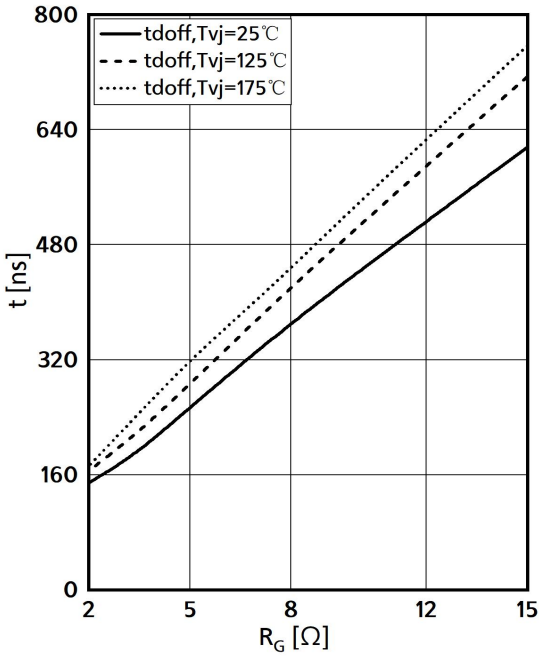


图 20. 关断特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
t_f= f (RG)
V_{GS} = -8V to 15 V, I_D= 600 A, V_{DS} = 750 V

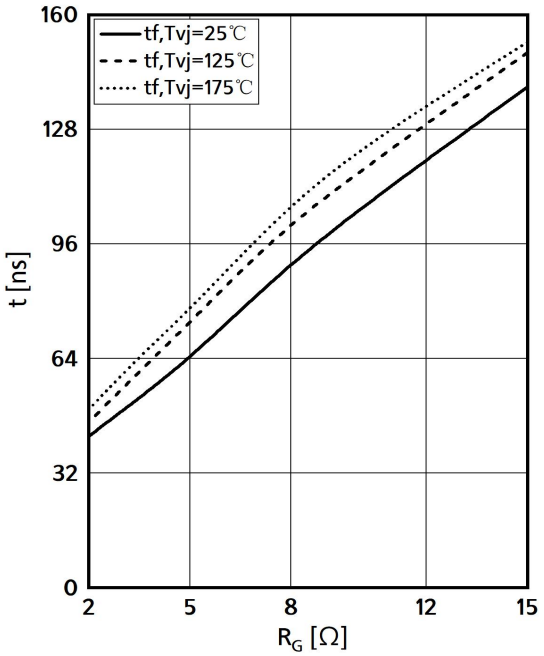


图 21. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
di/dt =f (RG),V_{GS} = -8V to 15 V, ID=600 A, V_{DS} = 750 V,T_{vj}=175°C

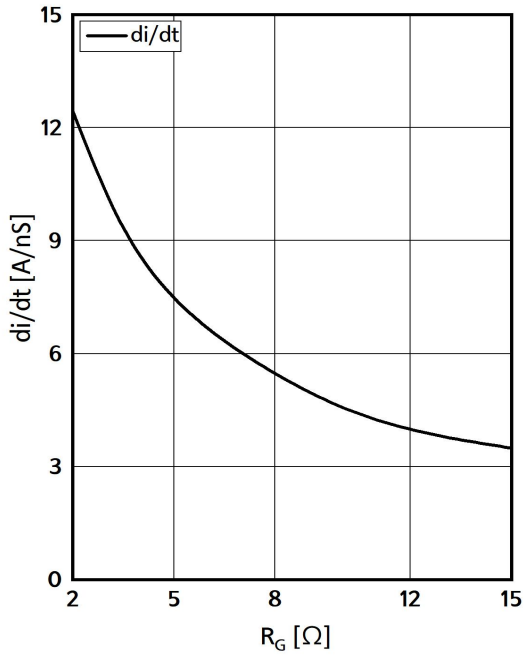


图 22. 导通特性 SIC，逆变器（典型）
On-State Characteristics SIC, Inverter (typical)
dv/dt =f (RG),V_{GS} = -8V to 15 V, ID=600 A, V_{DS} = 750 V,T_{vj}=175°C

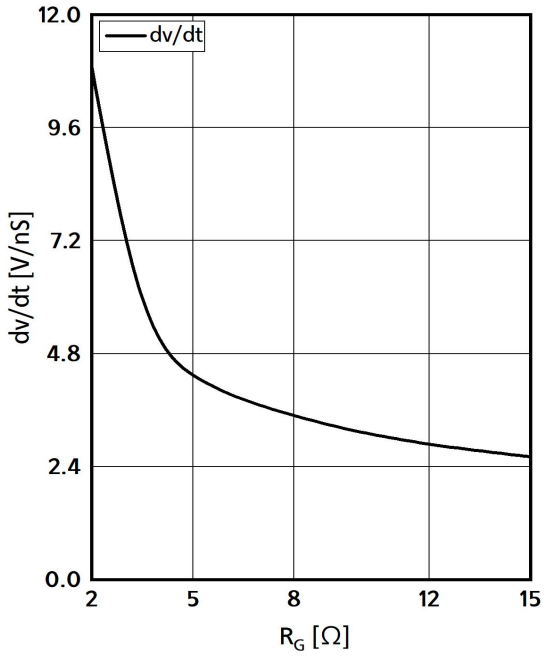


图 23. 关断特性 SIC，逆变器（典型）
Off-State Characteristics SIC, Inverter (typical)
di/dt =f (RG),V_{GS} = -8V to 15 V, ID= 600A, V_{DS} = 750 V,T_{vj}=175°C

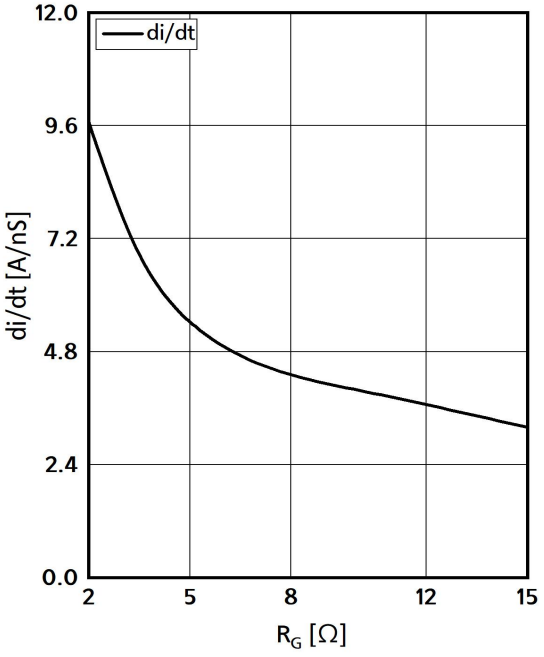


图 24. 关断特性 SIC，逆变器（典型）
Off-State Characteristics SIC, Inverter (typical)
dv/dt =f (RG),V_{GS} = -8V to 15 V, ID= 600 A, V_{DS} = 750 V,T_{vj}=175°C

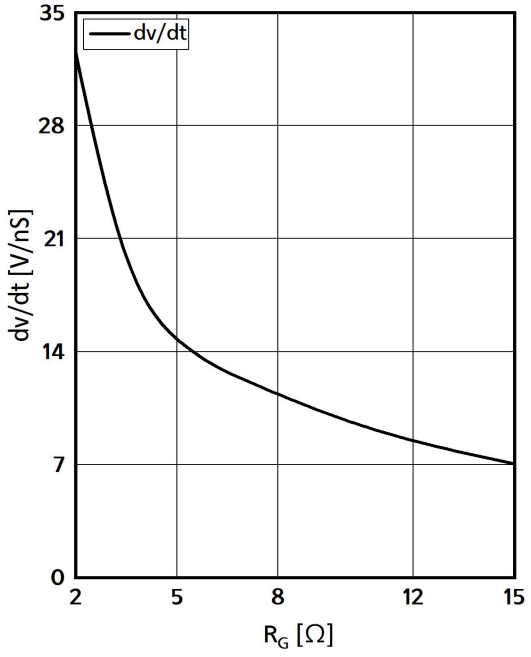


图 25. 正向特性 体二极管(典型)，MOSFET
Capacity characteristic (typical) , MOSFET
$I_{SD} = f(V_{SD})$
$T_{vj} = 25℃$

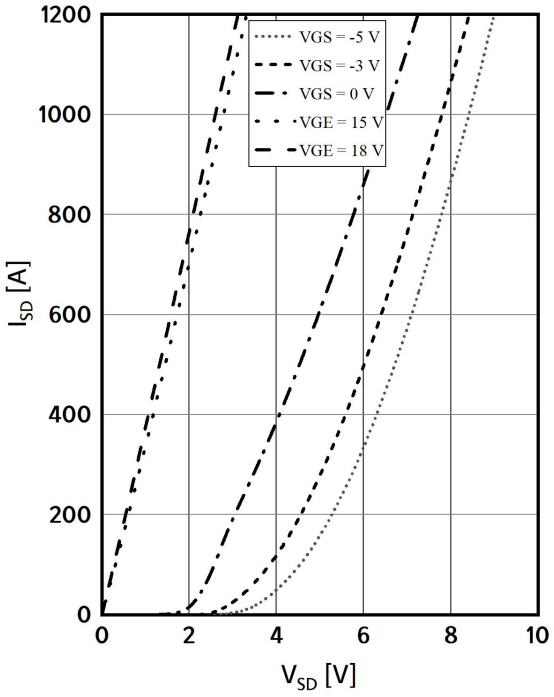


图 26. 体二极管正向压降(典型)，MOSFET
Gate charge characteristic (typical) , MOSFET
$I_{SD} = f(T_{vj})$
$I_{SD} = 600A$

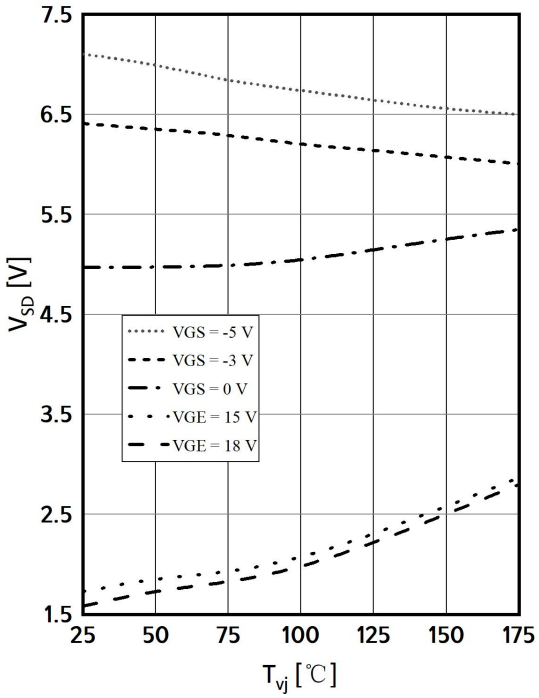


图 27.反偏安全工作区
Reverse bias safe operating area SIC (RBSOA)
$I_D = f(V_{DS})$，V_{GS} =-5 V to 18V，R_{Goff} =15Ω，T_{vj} =175°C

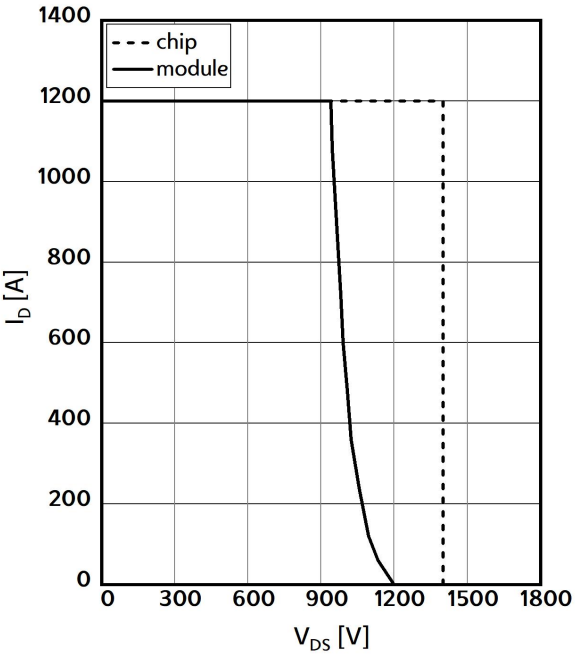


图 28. 反向恢复损耗 二极管，逆变器（典型）
Reverse recovery losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$，V_{GS} = -5 V to 18 V, R_{Gon} =2 Ω, V_{DS} = 750 V

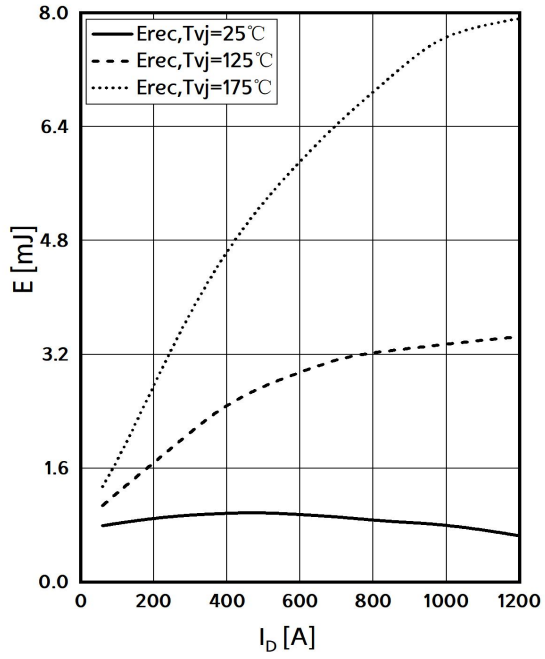


图 29. 反向恢复时间 二极管，逆变器（典型）
Reverse recovery times Diode, Inverter (typical)
$t_{rr} = f(I_F)$
V_{GS} = -5 V to 18 V, R_{Gon} =2 Ω, V_{DS} = 750 V

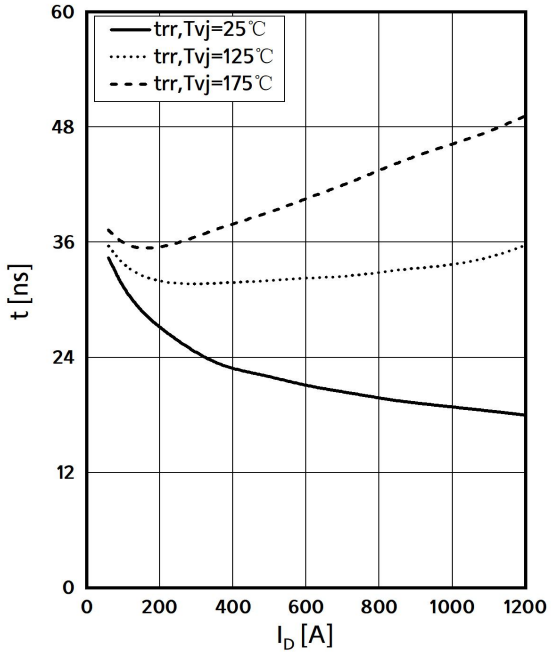


图 30. 反向恢复损耗 二极管，逆变器（典型）
Reverse recovery losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
V_{GS} = -5 V to 18 V, I_F= 600 A, V_{DS} = 750 V

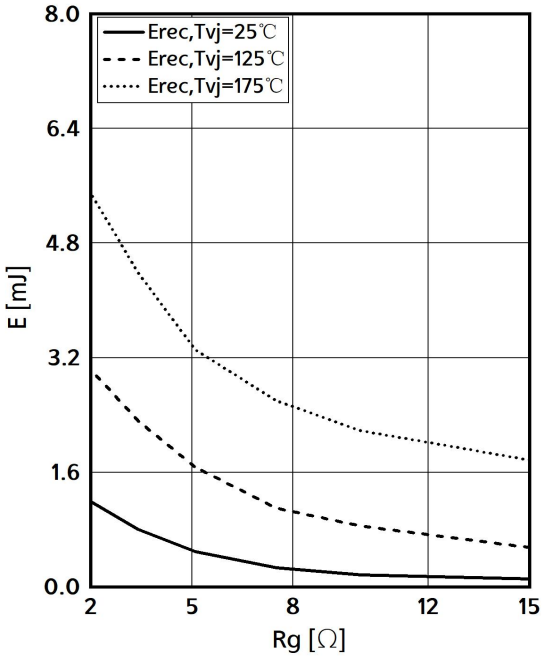


图 31. 反向恢复时间 二极管，逆变器（典型）
Reverse recovery times Diode, Inverter (typical)
$t_{rr} = f(R_G)$
V_{GS} = -5 V to 18 V, I_F= 600 A, V_{DS} = 750 V

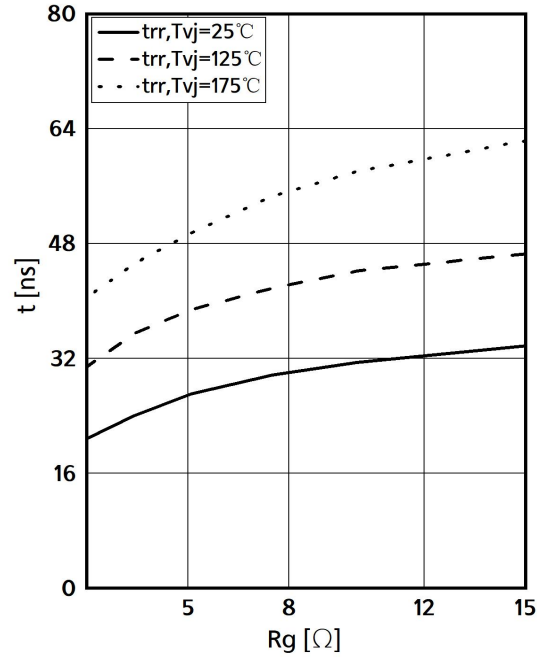


图 15. 瞬态热阻抗 MOSFET，逆变器（典型）
Transient thermal impedance MOSFET, Inverter (typical)
$Z_{thJC} = f(t)$

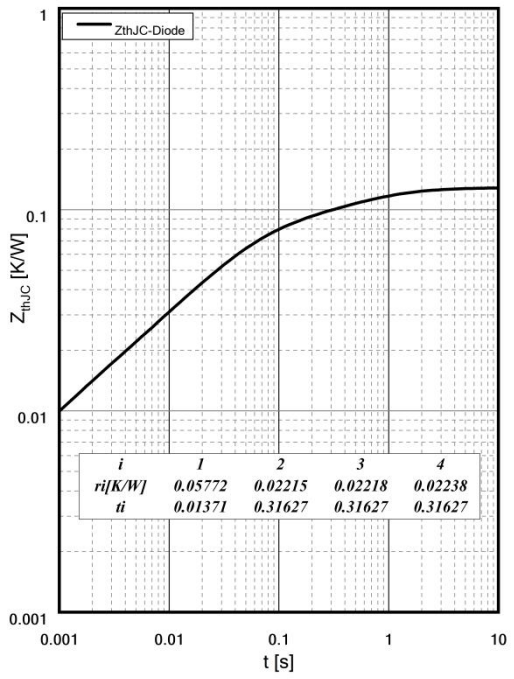
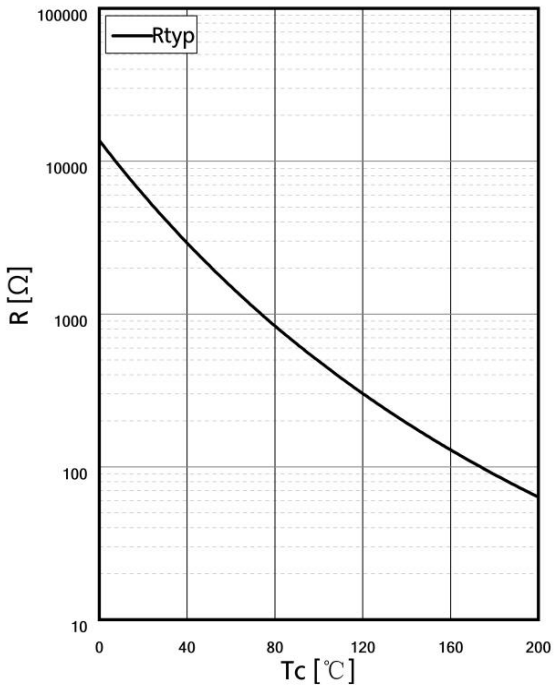
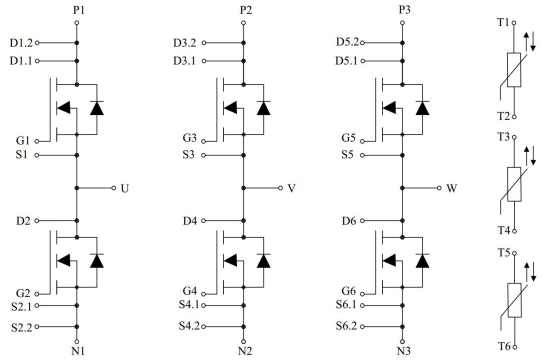


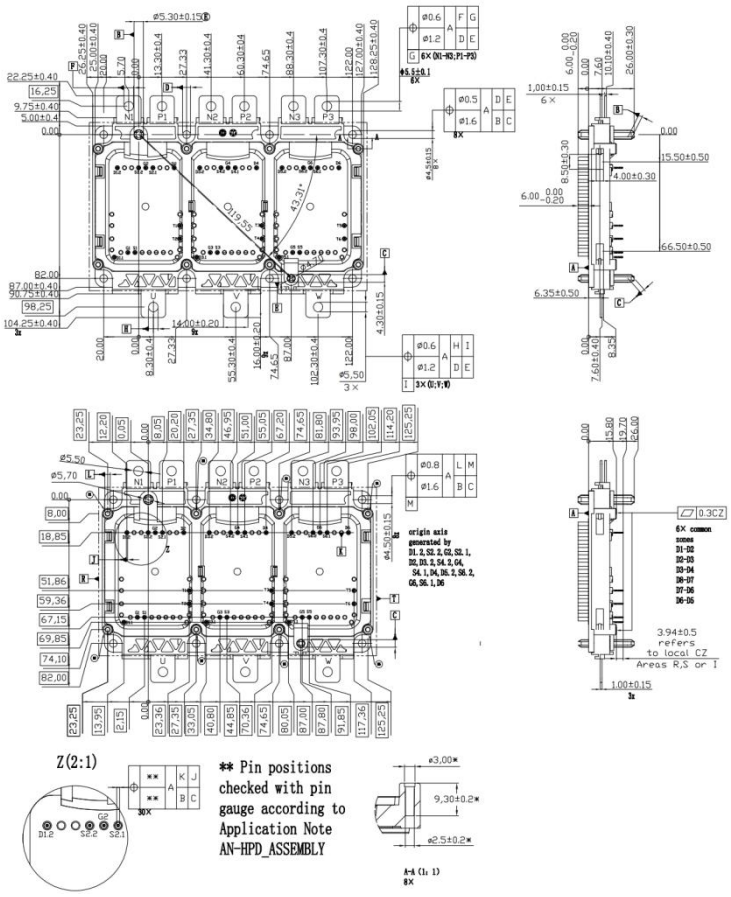
图 33. 热敏电阻温度曲线
Thermistor temperature characteristic
R = f (T)



接线图 / Circuit Diagram



封装尺寸 / Package Outlines



Revison History			
Revision	Date	Relase condtions	Major changes
0.1	2026/3/27	Initial release	

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