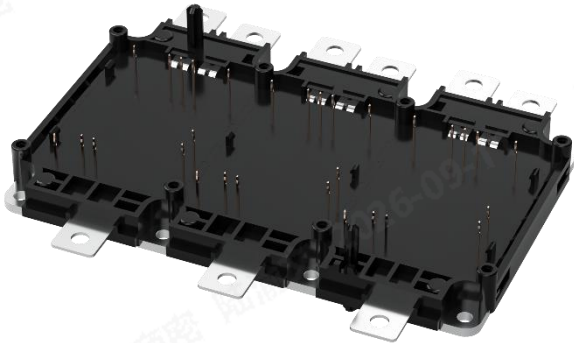


1200V, 1.2mΩ SiC MOSFET Module

Features

- Electrical features
 - $V_{DS} = 1200V$
 - $I_{DN} = 900A$ / $I_{DRM}^* = 1800A$
 - Standard housing
 - Isolated base plate
 - High power density
 - Low $R_{DS(on)}$
 - Low Switching Losses
 - $T_{vj\ op} = 175^{\circ}C$
- Mechanical features
 - 4.2kV DC 1 sec Insulation
 - High Creepage and Clearance Distances
 - Compact design
 - Direct Cooled PinFin Base Plate
 - High Performance Si_3N_4 Ceramic
 - Guiding elements for PCB and cooler assembly
 - Integrated NTC temperature sensor
 - RoHS compliant

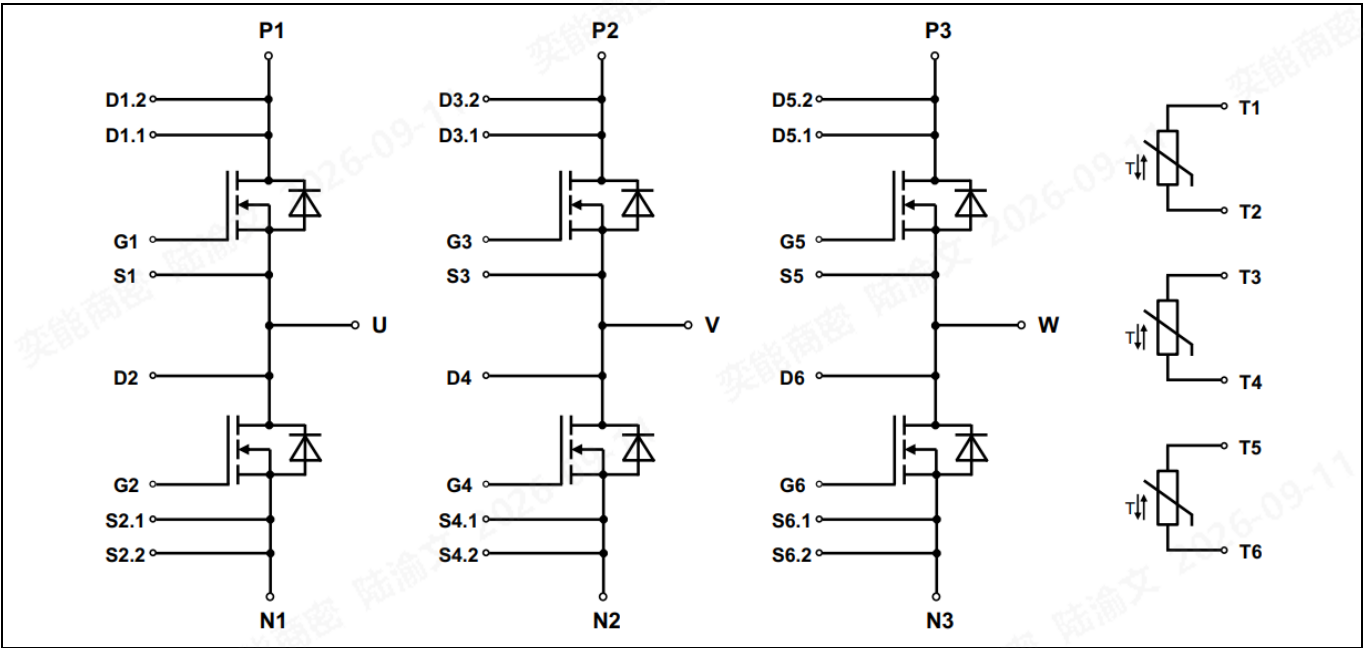
V_{DS}	1200V
$R_{DS(on)}$	1.2mΩ



Typical applications

- Automotive Applications
- Hybrid Electrical Vehicles (H)EV
- Motor Drives
- Commercial Agriculture Vehicles

Circuit diagram



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1 Package

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Value	Unit
Isolation Test Voltage	V_{ISOL}	$V_{DC}, t = 1\text{sec}$	4.2	kV
Material of Module Baseplate			Cu	
Internal Isolation		Basic insulation (class 1, IEC 61140)	Si_3N_4	
Creepage Distance	d_{Creep}	Terminal to heatsink	9	mm
Creepage Distance	d_{Creep}	Terminal to terminal	9	mm
Clearance	d_{Clear}	Terminal to heatsink	4.5	mm
Clearance	d_{Clear}	Terminal to terminal	4.5	mm
Comparative Tracking Index	CTI		>200	

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Stray Inductance Module	L_s			7.9		nH
Module Lead Resistance, terminals - chip	$R_{DD'+SS'}$	$T_C = 25^\circ\text{C}$, per Switch		0.9		mΩ
Storage Temperature	T_{stg}		-40		125	°C
Mounting Torque for Module Mounting	M	Mounting according to valid application note M4, Screw	1.8		2.2	Nm
Terminal Connection Torque	M	Mounting according to valid application note M5, Screw	1.8		2.2	Nm
Weight	G			808		g

2 MOSFET, T1/T2

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition	Value	Unit
Drain-source Voltage	V_{DSS}	$T_{vj} = 25^\circ\text{C}$	1200	V

Parameter	Symbol	Note or test condition		Value	Unit
Implemented Drain Current	I_{DN}	Current rating based on chip rating times number of chips		900	A
Continuous DC Drain Current	I_{DDC}	$T_{vj} = 175^{\circ}\text{C}$, $V_{GS} = 18\text{V}$	$T_f = 60^{\circ}\text{C}$	660	A
Repetitive Peak Drain Current	I_{DRM}	Verified by design, t_p limited by T_{vjmax}		1800	A
Gate-source Voltage, Max. Static Voltage	V_{GS}			-10/22	V

Table 4 Recommended values

Parameter	Symbol	Note or test condition	Value	Unit
On-state Gate Voltage	$V_{GS(on)}$		18	V
Off-state Gate Voltage	$V_{GS(off)}$		-3	V

Table 5 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Drain-source On-resistance	$R_{DS(on)}$	$I_D = 900\text{A}$	$V_{GS} = 15\text{V}$, $T_{vj} = 25^{\circ}\text{C}$	1.49		mΩ
			$V_{GS} = 18\text{V}$, $T_{vj} = 25^{\circ}\text{C}$	1.27		
			$V_{GS} = 18\text{V}$, $T_{vj} = 125^{\circ}\text{C}$	2.16		
			$V_{GS} = 18\text{V}$, $T_{vj} = 175^{\circ}\text{C}$	2.92		
Gate Threshold Voltage	$V_{GS(th)}$	$I_D = 264\text{mA}$, $V_{DS} = V_{GS}$, $T_{vj} = 25^{\circ}\text{C}$, (tested after 1ms pulse at $V_{GS} = +20\text{V}$)		3.1		V
Total Gate Charge	Q_G	$V_{DD} = 800\text{V}$, $V_{GS} = -3/18\text{V}$, $T_{vj} = 25^{\circ}\text{C}$		1.56		μC
Internal Gate Resistor	R_{Gint}	$T_{vj} = 25^{\circ}\text{C}$		1.69		Ω
Input Capacitance	C_{ISS}	$f = 100\text{kHz}$, $V_{DS} = 800\text{V}$, $V_{GS} = 0\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	53.9		nF
Output Capacitance	C_{OSS}	$f = 100\text{kHz}$, $V_{DS} = 800\text{V}$, $V_{GS} = 0\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	1.94		nF
Reverse Transfer Capacitance	C_{rss}	$f = 100\text{kHz}$, $V_{DS} = 800\text{V}$, $V_{GS} = 0\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	0.041		nF

Parameter	Symbol	Note or test condition		Value			Unit
				Min.	Typ.	Max.	
C _{oss} Stored Energy	E _{oss}	V _{DS} = 800V, V _{GS} = -3/18V	T _{vj} = 25°C		1355		μJ
Drain-source Leakage Current	I _{DSS}	V _{DS} = 1200V, V _{GS} = 0V	T _{vj} = 25°C			800	μA
Gate-source Leakage Current	I _{GSS}	V _{DS} = 0V, T _{vj} = 25°C	V _{GS} = 22V			800	nA
Turn-on Delay Time (Inductive Load)	t _{d on}	I _D = 900A, R _{Gon} = 3Ω, V _{DD} = 800V, V _{GS} = -3/18V	T _{vj} = 25°C		169		ns
			T _{vj} = 125°C		155		
			T _{vj} = 175°C		152		
Rise Time (Inductive Load)	t _r	I _D = 900A, R _{Gon} = 3Ω, V _{DD} = 800V, V _{GS} = -3/18V	T _{vj} = 25°C		81		ns
			T _{vj} = 125°C		74		
			T _{vj} = 175°C		69		
Turn-off Delay Time (Inductive Load)	t _{d off}	I _D = 900A, R _{Goff} = 5.1Ω, V _{DD} = 800V, V _{GS} = -3/18V	T _{vj} = 25°C		577		ns
			T _{vj} = 125°C		651		
			T _{vj} = 175°C		689		
Fall Time (Inductive Load)	t _f	I _D = 900A, R _{Goff} = 5.1Ω, V _{DD} = 800V, V _{GS} = -3/18V	T _{vj} = 25 °C		74		ns
			T _{vj} = 125°C		85		
			T _{vj} = 175°C		89		
Turn-on Energy Loss per Pulse	E _{on}	I _D = 900A, V _{DD} = 800V, V _{GS} = -3/18V, R _{Gon} = 3Ω, di/dt=10.5kA/μs	T _{vj} = 25°C		28.7		mJ
			T _{vj} = 125°C		25.2		
			T _{vj} = 175°C		25.4		
Turn-off Energy Loss per Pulse	E _{off}	I _D = 900A, V _{DD} = 800V, V _{GS} = -3/18V, R _{Goff} = 5.1Ω, dv/dt = 7.9kV/μs	T _{vj} = 25°C		75.5		mJ
			T _{vj} = 125°C		79.6		
			T _{vj} = 175°C		81.5		
Thermal Resistance, Junction to Cooling Fluid	R _{thJF}	per MOSFET			0.0855		K/W
Temperature Under Switching Conditions	T _{vj op}			-40		175	°C

3 Body diode (MOSFET, T1/T2)

Table 6 Maximum rated values

Parameter	Symbol	Note or test condition		Value	Unit
DC Body Diode Forward Current	I_{SD}	$T_{vj} = 175^{\circ}\text{C}$ $V_{GS} = -3\text{V}$	$T_f = 60^{\circ}\text{C}$	340	A

Table 7 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_{SD}	$I_{SD} = 900\text{A}$, $V_{GS} = -3\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	4.93		V
			$T_{vj} = 125^{\circ}\text{C}$	4.58		
			$T_{vj} = 175^{\circ}\text{C}$	4.44		
Peak Reverse Recovery Current	I_{rrm}	$I_{SD} = 900\text{A}$, $di_s/dt = 16.3\text{kA}/\mu\text{s}$, $V_{DD} = 800\text{V}$, $V_{GS} = -3\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	169		A
			$T_{vj} = 125^{\circ}\text{C}$	333		
			$T_{vj} = 175^{\circ}\text{C}$	435		
Recovered Charge	Q_{rr}	$I_{SD} = 900\text{A}$, $di_s/dt = 16.3\text{kA}/\mu\text{s}$, $V_{DD} = 800\text{V}$, $V_{GS} = -3\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	2.4		μC
			$T_{vj} = 125^{\circ}\text{C}$	8.0		
			$T_{vj} = 175^{\circ}\text{C}$	12.1		
Reverse Recovery Energy	E_{rec}	$I_{SD} = 900\text{A}$, $di_s/dt = 16.3\text{kA}/\mu\text{s}$, $V_{DD} = 800\text{V}$, $V_{GS} = -3\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	1.81		mJ
			$T_{vj} = 125^{\circ}\text{C}$	6.18		
			$T_{vj} = 175^{\circ}\text{C}$	9.27		

4 NTC-Thermistor

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}	$T_{NTC} = 25^{\circ}\text{C}$		5		k Ω
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100^{\circ}\text{C}$, $R_{100} = 493\Omega$	-5		5	%
Power Dissipation	P_{25}	$T_{NTC} = 25^{\circ}\text{C}$			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15\text{K}))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15\text{K}))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15\text{K}))]$		3433		K

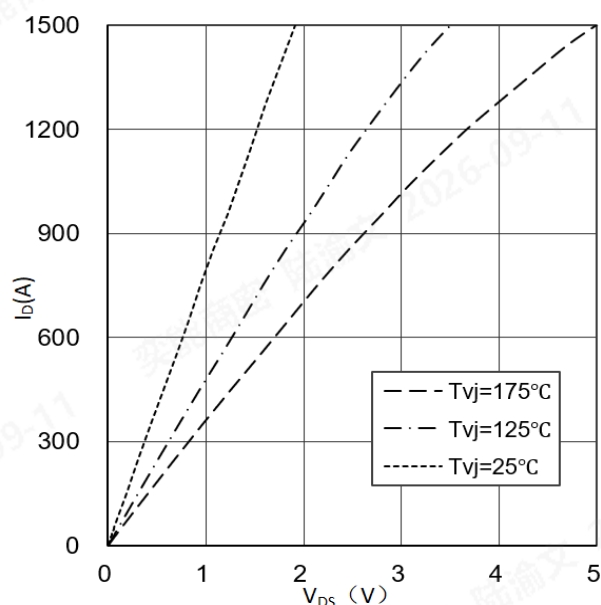
5 Characteristic diagrams

5 Characteristic diagrams

Output characteristic (typical), MOSFET, T1/T2

$I_D = f(V_{DS})$

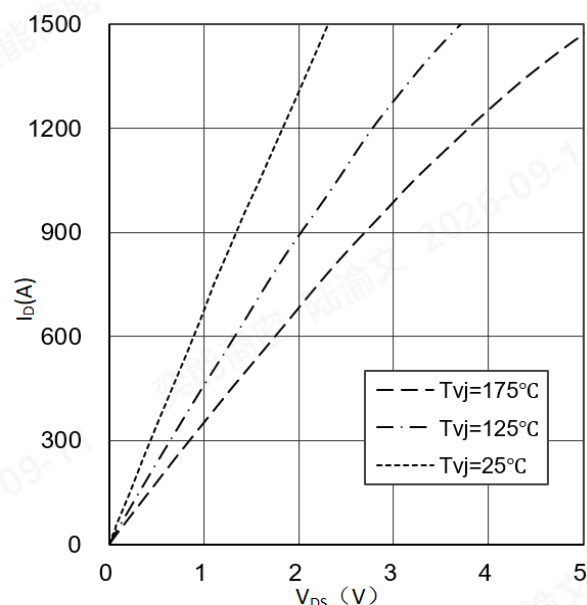
$V_{GS} = 18V$



Output characteristic (typical), MOSFET, T1/T2

$I_D = f(V_{DS})$

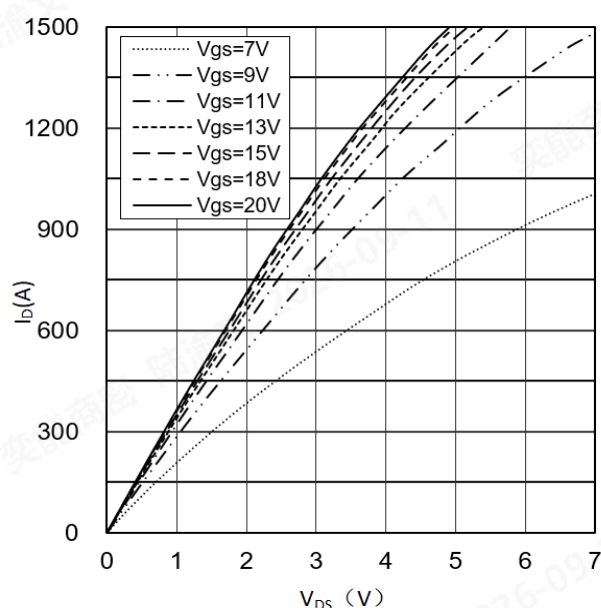
$V_{GS} = 15V$



Output characteristic (typical), MOSFET, T1/T2

$I_D = f(V_{DS})$

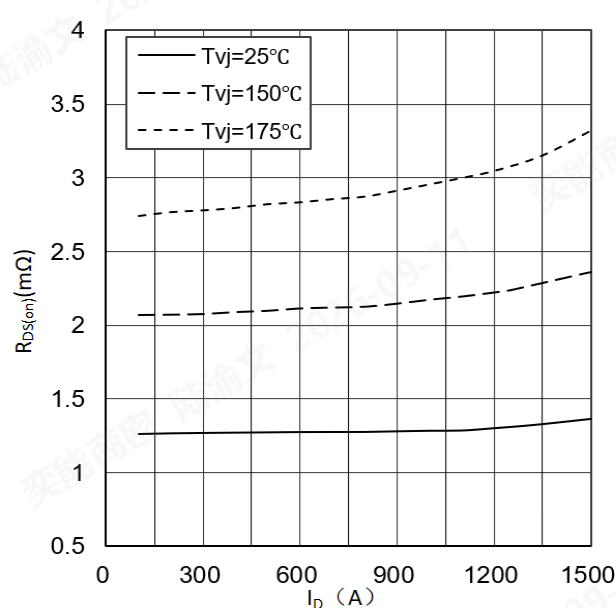
$T_{vj} = 175^{\circ}C$



Output characteristic (typical), MOSFET, T1/T2

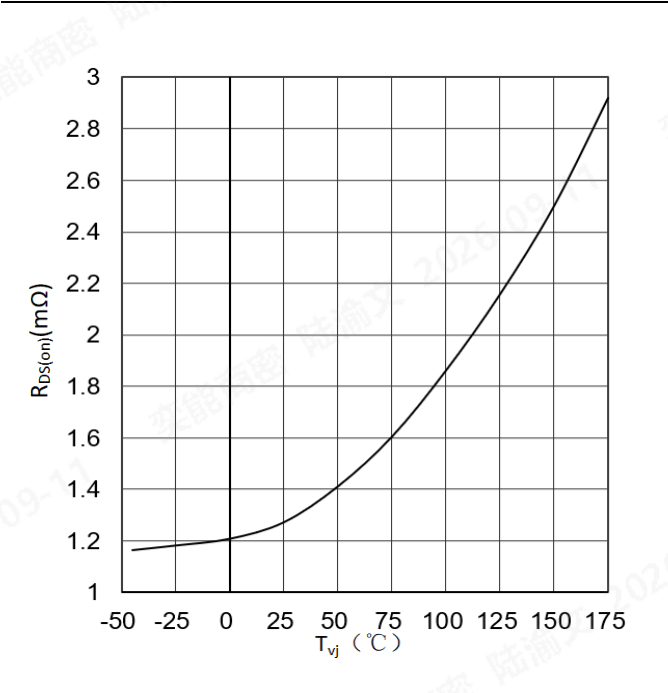
$R_{DS(on)} = f(I_D)$

$V_{GS} = 18V$

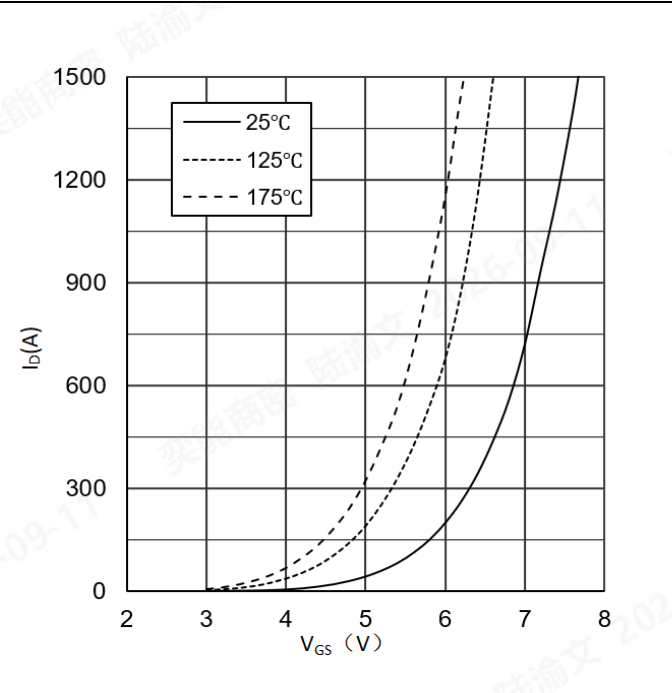


5 Characteristic diagrams

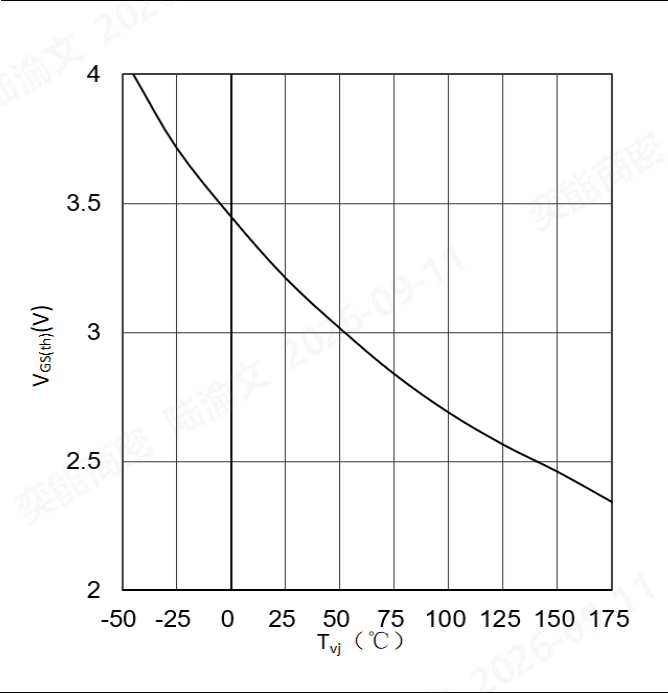
Drain-source on resistance as a function of junction temperature (typical)
 $R_{DS(on)} = f(T_{vj})$
 $I_D = 900A, V_{GS} = 18V$



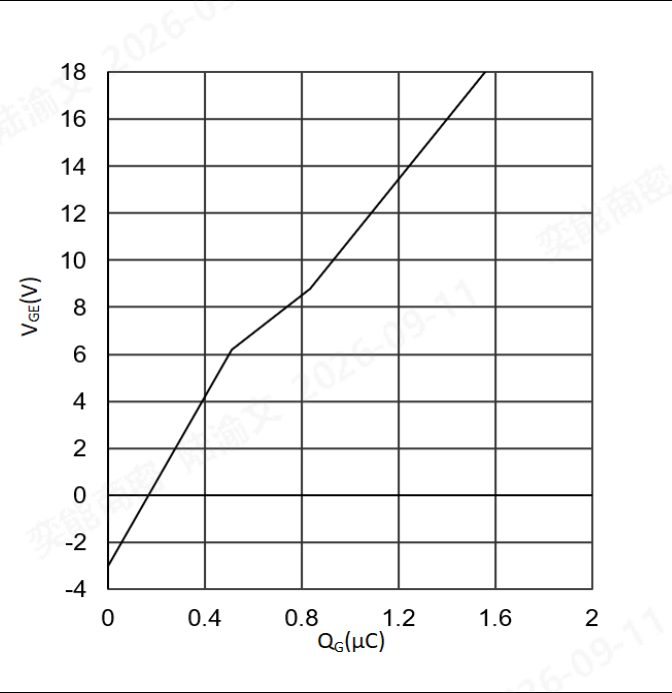
Transfer characteristic (typical)
 $I_D = f(V_{GS})$
 $V_{DS} = 20V$



Gate-source threshold voltage as a function of junction temperature (typical)
 $V_{GS(th)} = f(T_{vj})$
 $V_{GS} = V_{DS}, I_D = 264mA$



Gate charge (typical)
 $V_{GS} = f(Q_G)$
 $I_D = 900A, V_{DS} = 800V$

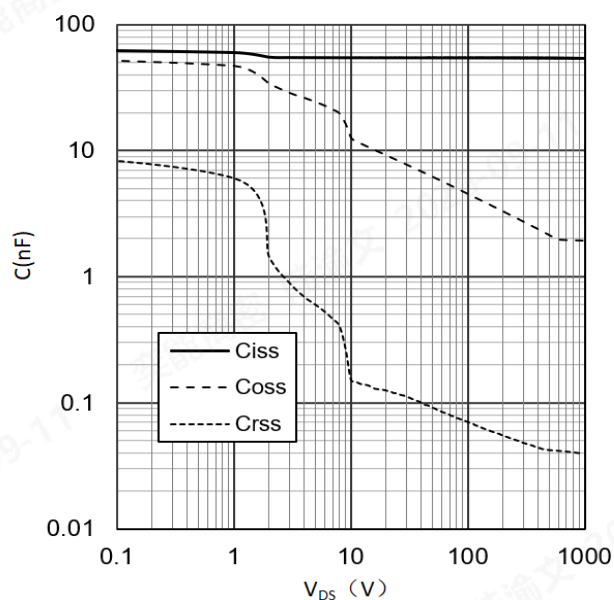


5 Characteristic diagrams

Typical capacitance as a function of drain-source voltage

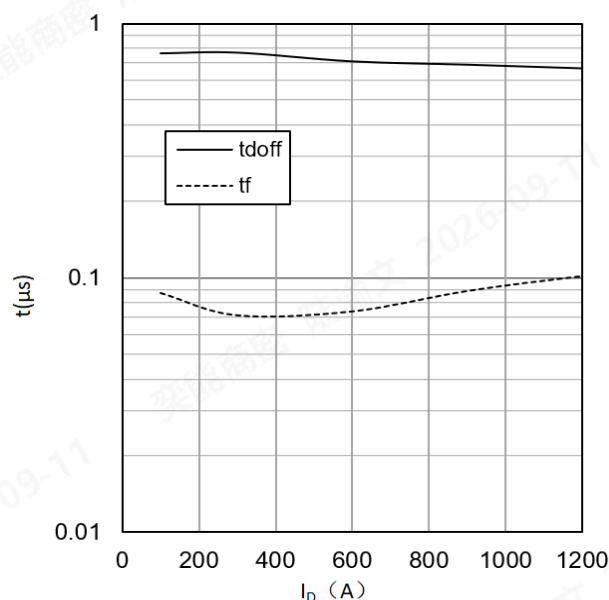
$C = f(V_{DS})$

$f = 100\text{kHz}, V_{GS} = 0\text{V}$

**Switching times (typical)**

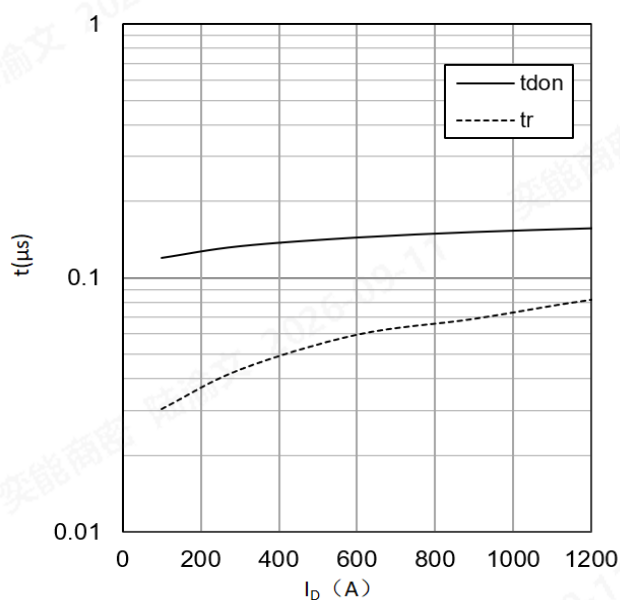
$t = f(I_D)$

$R_{goff} = 5.1\Omega, V_{GS} = -3/+18\text{V}, V_{DS} = 800\text{V}, T_{vj} = 175^\circ\text{C}$

**Switching times (typical)**

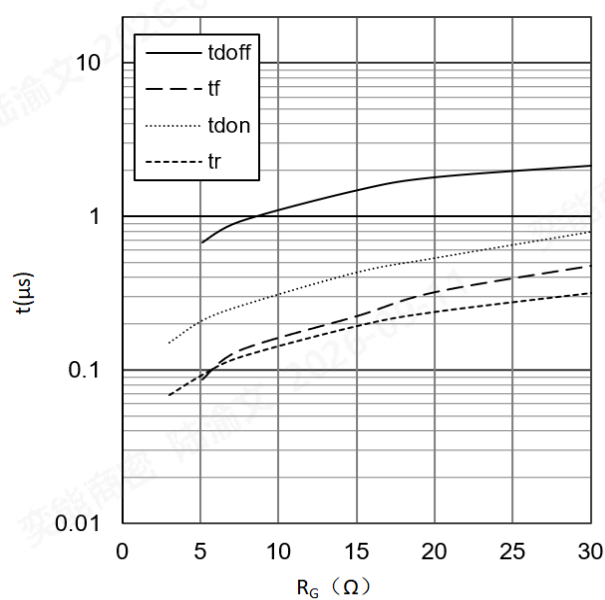
$t = f(I_D)$

$R_{gon} = 3\Omega, V_{GS} = -3/+18\text{V}, V_{DS} = 800\text{V}, T_{vj} = 175^\circ\text{C}$

**Switching times (typical)**

$t = f(R_G)$

$V_{GS} = -3/+18\text{V}, I_D = 900\text{A}, V_{DS} = 800\text{V}, T_{vj} = 175^\circ\text{C}$

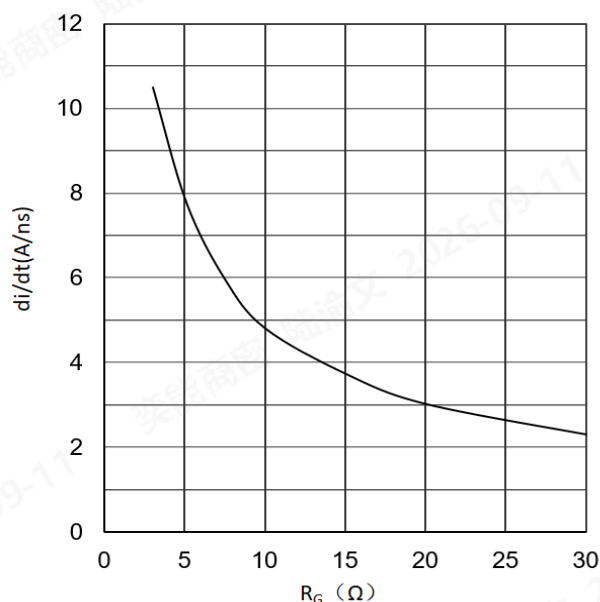


5 Characteristic diagrams

Current slope (typical)

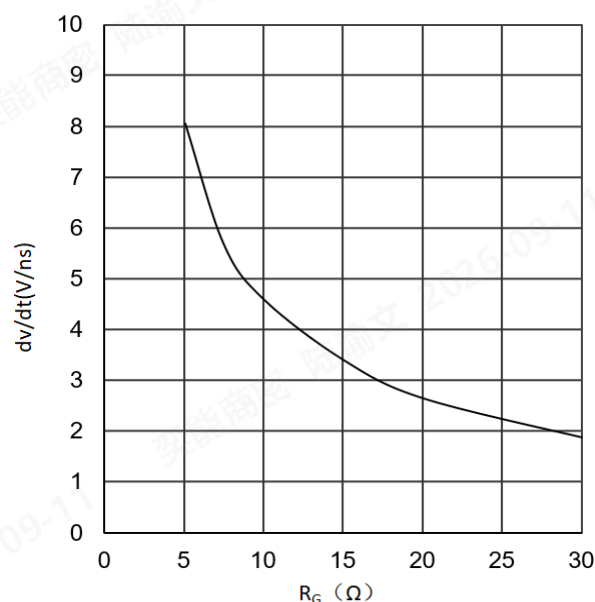
$$di/dt = f(R_G)$$

$$V_{GS} = -3/+18V, I_D = 900A, V_{DS} = 800V, T_{vj} = 175^\circ C$$

**Voltage slope (typical)**

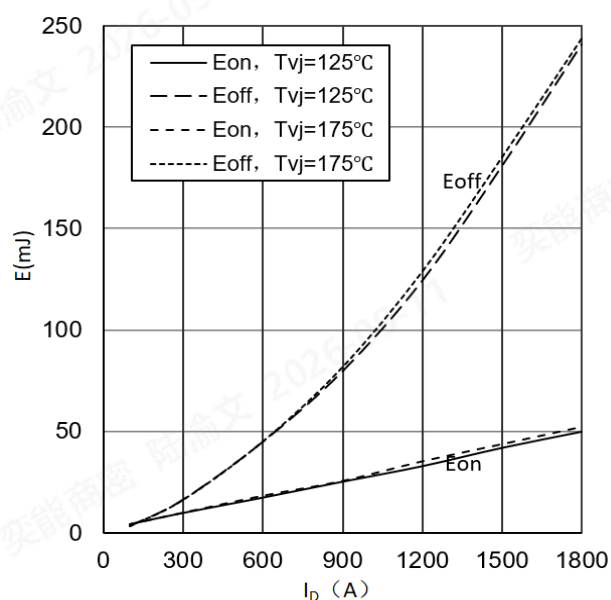
$$dv/dt = f(R_G)$$

$$V_{GS} = -3/+18V, I_D = 900A, V_{DS} = 800V, T_{vj} = 175^\circ C$$

**Switching losses (typical)**

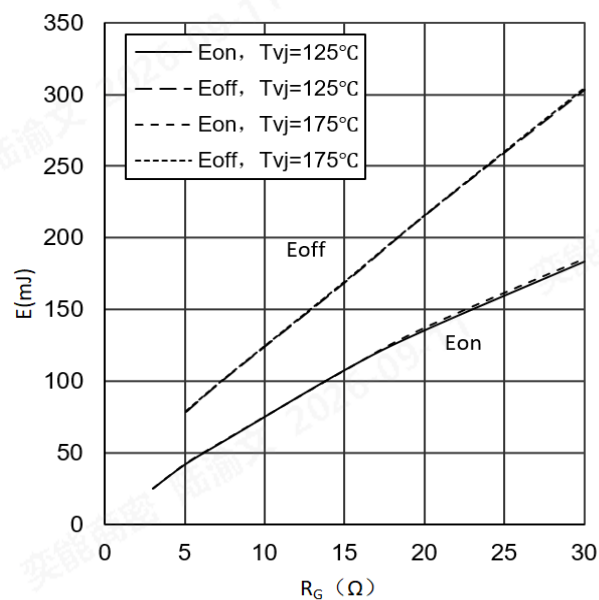
$$E = f(I_D)$$

$$V_{GS} = -3/+18V, R_{Gon} = 3\Omega, R_{Goff} = 5.1\Omega, V_{DS} = 800V$$

**Switching losses (typical)**

$$E = f(R_G)$$

$$V_{GS} = -3/+18V, I_D = 900A, V_{DS} = 800V$$

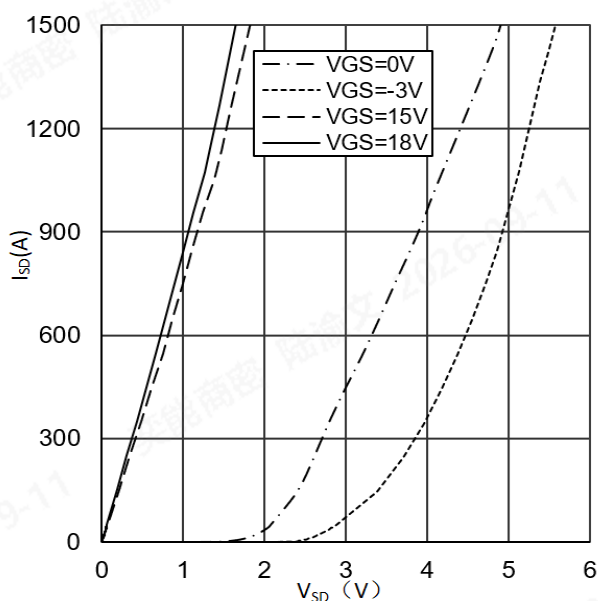


5 Characteristic diagrams

Forward characteristic of Diode (typical)

$$I_{SD} = f(V_{SD})$$

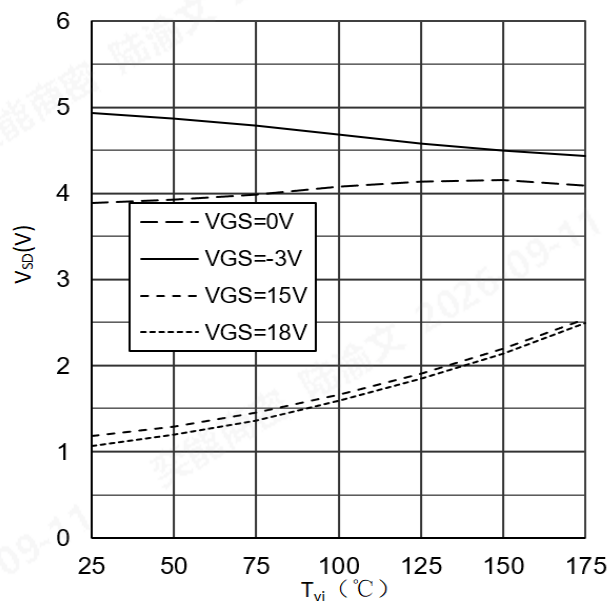
$$T_{vj} = 25^{\circ}\text{C}$$



Forward characteristic of Diode (typical)

$$V_{SD} = f(T_{vj})$$

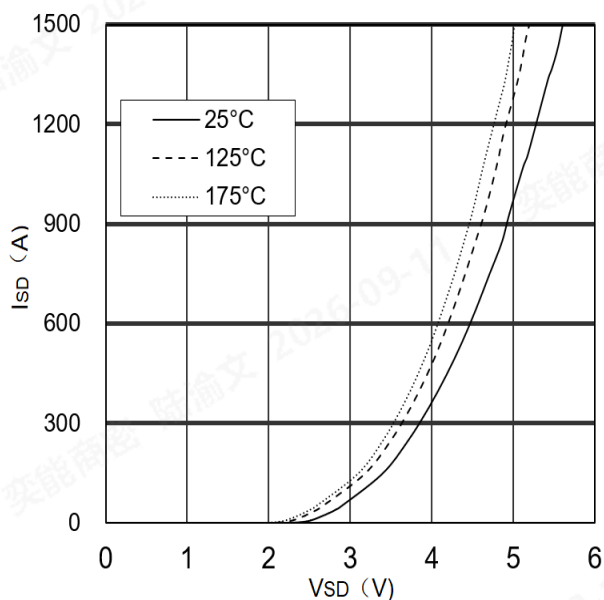
$$I_{SD} = 900\text{A}$$



Forward characteristic body diode (typical), MOSFET

$$I_{FS} = f(V_{SD})$$

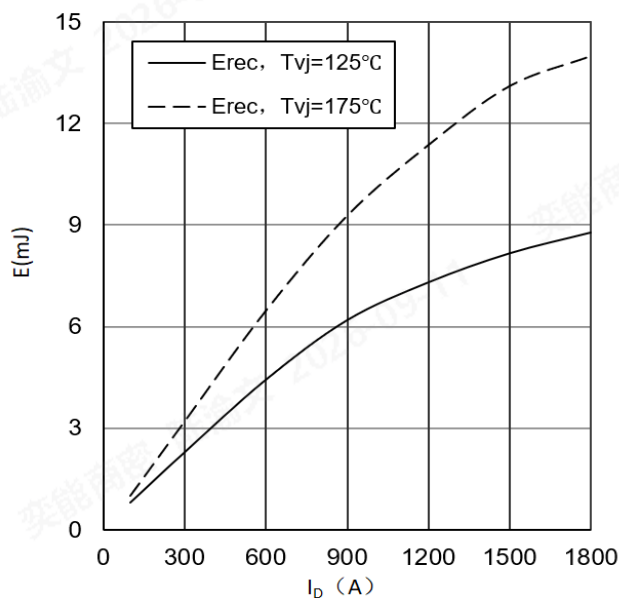
$$V_{GS} = -3\text{V}$$



Switching losses body diode (typical)

$$E_{rec} = f(I_{SD})$$

$$V_{GS} = -3/+18\text{V}, R_{Gon} = 3\Omega, V_{DS} = 800\text{V}$$

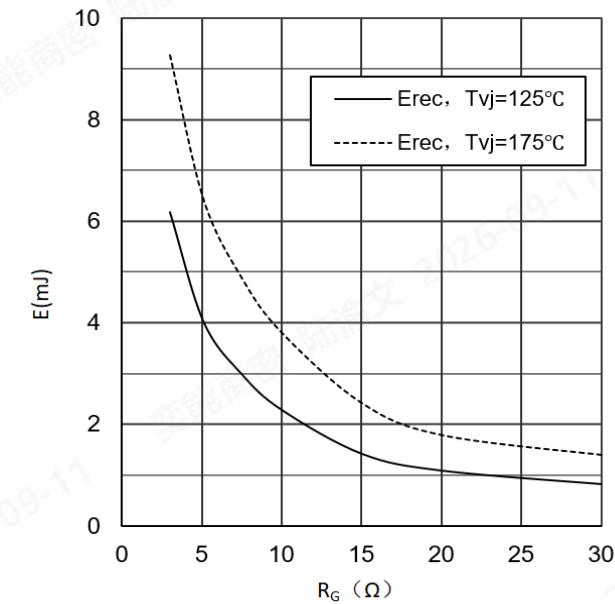


5 Characteristic diagrams

Switching losses body diode (typical)

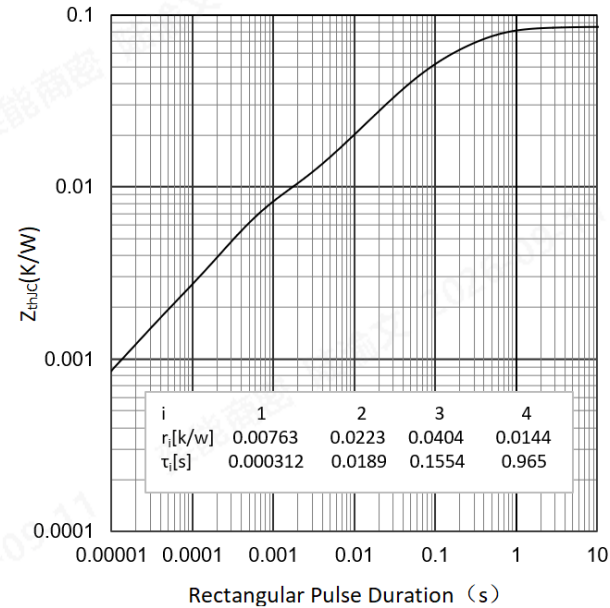
$E_{rec} = f(R_G)$

$V_{GS} = -3/+18V, I_D = 900, V_{DS} = 800V$



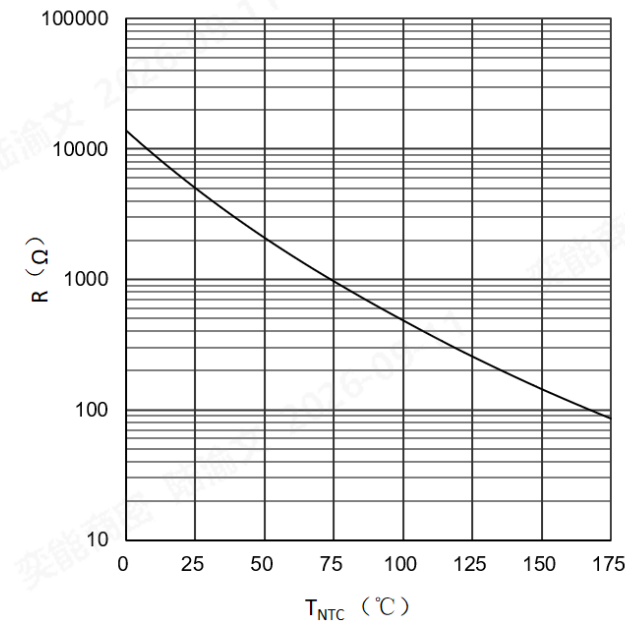
Transient thermal impedance as a function of pulse width

$Z_{th(j-f)} = (t_p)$



NTC-Thermistor-temperature characteristic (typical)

$R = f(T)$



Revision history

Document revision	Date of release	Description of changes
1.3	2026-06-23	Change the NTC diagram
1.2	2026-06-11	Update parameters
1.1	2025-12-23	Update the test condition
1.0	2025-10-29	Initial version

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Due to technical requirements, components of the product may contain dangerous substances. For information on the types in question, please contact the sales staff responsible for you.

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