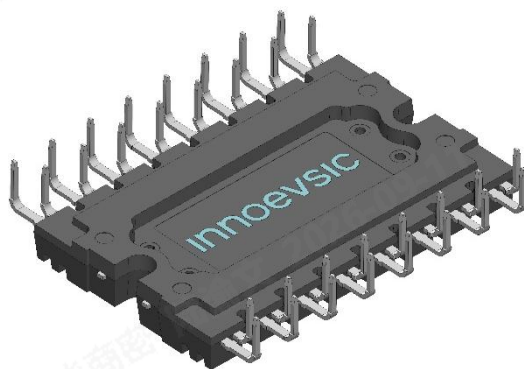


1200V, 75mΩ SiC MOSFET Module

Features

- Electrical features
 - $V_{DS} = 1200V$
 - $I_{DN} = 20A$ / $I_{DRM}^* = 60A$
 - Integrated temperature sensor
- Mechanical features
 - Standard housing
 - ZTA material
 - Isolated base plate
 - High power density

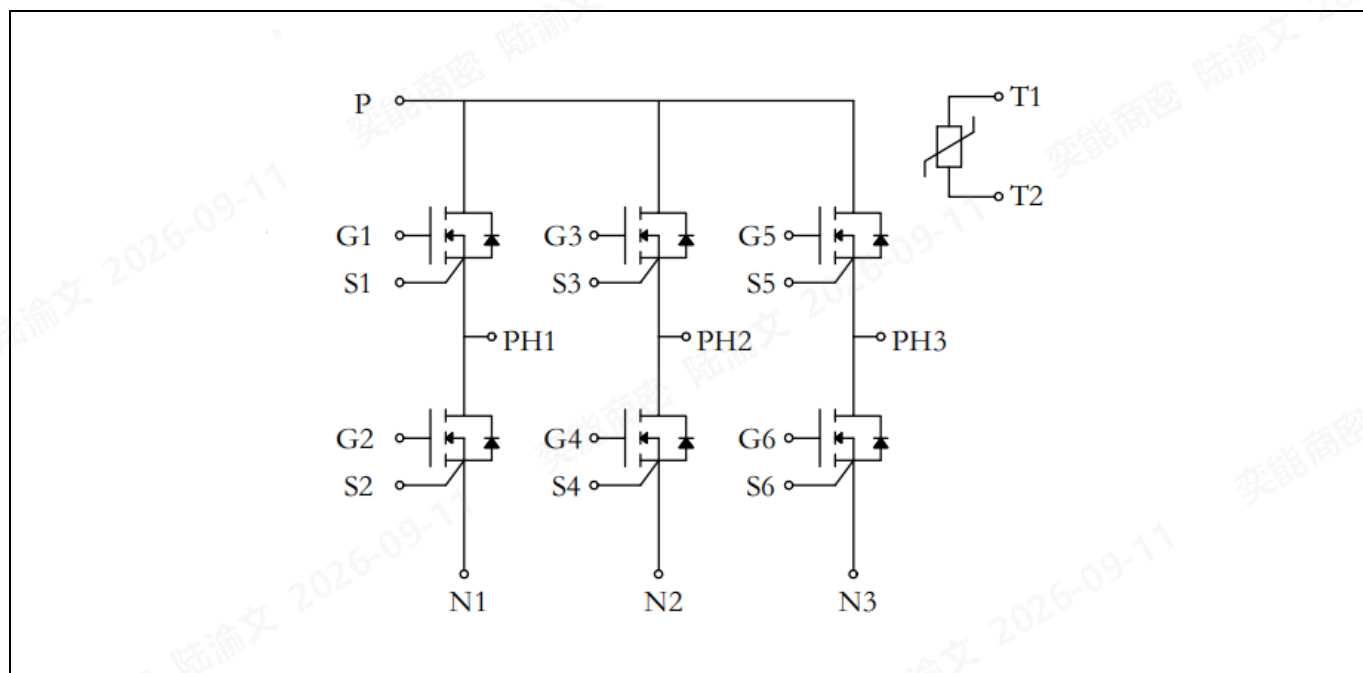
V_{DS}	1200V
$R_{DS(on)}$	75mΩ



Typical applications

- On Board Charger (OBC)
- Active Inverter
- Motor Driver
- Thermal Management System (Pump & Fan)

Circuit diagram



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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Value	Unit
Isolation Test Voltage	V_{ISOL}	RMS, $f = 50\text{Hz}$, $t = 1\text{min}$	3.5	kV
Material of Module Baseplate			Cu	
Internal Isolation		Basic insulation (class 1, IEC 61140)	ZTA	
Creepage Distance	$d_{Creep\ nom}$	terminal to baseplate, nom.		mm
Creepage Distance	$d_{Creep\ min}$	Terminal to baseplate, min.		mm
Creepage Distance	$d_{Creep\ nom}$	Terminal to terminal, nom.		mm
Creepage Distance	$d_{Creep\ min}$	Terminal to terminal, min.		mm
Clearance	$d_{Clear\ nom}$	Terminal to baseplate, nom.		mm
Clearance	$d_{Clear\ min}$	Terminal to baseplate, min.		mm
Clearance	$d_{Clear\ nom}$	Terminal to terminal, nom.		mm
Clearance	$d_{Clear\ min}$	Terminal to terminal, min.		mm
Comparative Tracking Index	CTI			

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Stray Inductance Module	L_s			40		nH
Module Lead Resistance, terminals - chip	$R_{DD'+SS'}$	$T_C = 25^\circ\text{C}$, per switch				m Ω
Storage Temperature	T_{stg}		-40		125	$^\circ\text{C}$
Weight	G			13.4		g

2 MOSFET

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Value	Unit
Drain-source Voltage	V_{DS}		$T_{vj} = 25^{\circ}\text{C}$	1200	V
DC drain current	$I_{D,nom}$	$T_{vj} = 175^{\circ}\text{C}$, $V_{GS} = 18\text{V}$	$T_C = 50^{\circ}\text{C}$	20	A
Pulsed drain current	$I_{D,pulse}$	Verified by design, t_p limited by T_{vjmax}		60	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	$V_{GS(off)}$		-4	V

Table 5 Characteristic values

Parameter	Symbol	Note or test condition		Value			Unit
				Min.	Typ.	Max.	
Drain-source On-resistance	$R_{DS(on)}$	$I_D = 20\text{A}$	$V_{GS} = 15\text{V}$, $T_{vj} = 25^{\circ}\text{C}$		75		mΩ
			$V_{GS} = 15\text{V}$, $T_{vj} = 175^{\circ}\text{C}$		110		
			$V_{GS} = 18\text{V}$, $T_{vj} = 25^{\circ}\text{C}$		60		
			$V_{GS} = 18\text{V}$, $T_{vj} = 175^{\circ}\text{C}$		109		
Gate Threshold Voltage	$V_{GS(th)}$	$I_D = 5\text{mA}$, $V_{DS} = V_{GS}$, $T_{vj} = 25^{\circ}\text{C}$,			2.8		V
		$I_D = 5\text{mA}$, $V_{DS} = V_{GS}$, $T_{vj} = 175^{\circ}\text{C}$,			2.1		V
Total Gate Charge	Q_G	$V_{DD} = 1000\text{V}$, $V_{GS} = -4/15\text{V}$	$T_{vj} = 25^{\circ}\text{C}$		45		nC

Parameter	Symbol	Note or test condition		Value			Unit
				Min.	Typ.	Max.	
Internal Gate Resistor	R _{Gint}	T _{vj} = 25°C, f=1MHz, V _{AC} = 25mV			1.5		Ω
Input Capacitance	C _{iss}	f =100kHz, V _{DS} = 1000V, V _{GS} = 0V	T _{vj} =25°C		1037		pF
Output Capacitance	C _{oss}	f =100kHz, V _{DS} = 1000V, V _{GS} = 0V	T _{vj} =25°C		65		pF
Reverse Transfer Capacitance	C _{rss}	f =100kHz, V _{DS} = 1000V, V _{GS} = 0V	T _{vj} =25°C		3.8		pF
C _{oss} Stored Energy	E _{oss}	V _{DS} = 1000V, V _{GS} = -5/18	T _{vj} =25°C		40		μJ
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 1200V, V _{GS} =0V	T _{vj} =25°C			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} = 0V, V _{GS} = 18V	T _{vj} =25°C			100	nA
Turn-on Delay Time (Inductive Load)	t _{d on}	V _{DD} = 800V, V _{GS} = -4/18V I _D = 49A, R _{Gon} = 2.5Ω, R _{Goff} = 2.5Ω,	T _{vj} =25°C		13		ns
			T _{vj} =125°C		TBD		
			T _{vj} =175°C		TBD		
Rise Time (Inductive Load)	t _r		T _{vj} =25°C		11		ns
			T _{vj} =125°C		TBD		
			T _{vj} =175°C		TBD		
Turn-off Delay Time (Inductive Load)	t _{d off}		T _{vj} =25°C		16		ns
			T _{vj} =125°C		TBD		
			T _{vj} =175°C		TBD		
Fall Time (Inductive Load)	t _f		T _{vj} =25°C		9		ns
			T _{vj} =125°C		TBD		
			T _{vj} =175°C		TBD		
	E _{on}			T _{vj} =25°C		136	

3 Body diode (MOSFET)

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Turn-on Energy Loss per Pulse		$T_{vj} = 125^{\circ}\text{C}$		TBD		
		$T_{vj} = 175^{\circ}\text{C}$		TBD		
Turn-off Energy Loss per Pulse	E_{off}	$T_{vj} = 25^{\circ}\text{C}$		28		mJ
		$T_{vj} = 125^{\circ}\text{C}$		TBD		
		$T_{vj} = 175^{\circ}\text{C}$		TBD		
Thermal Resistance, Junction to Case	R_{thJC}	per MOSFET		0.385		K/W
Thermal Resistance, Case to Heatsink	R_{thCH}	per MOSFET, $\lambda_{grease} = 1\text{W}/(\text{m}^{\circ}\text{K})$		0.45		K/W
Temperature Under Switching Conditions	$T_{vj\ op}$		-40		175	$^{\circ}\text{C}$

3 Body diode (MOSFET)

Table 6 Maximum rated values

Parameter	Symbol	Note or test condition		Value	Unit
DC Body Diode Forward Current	I_{SD}	$T_{vj} = 175^{\circ}\text{C},$ $V_{GS} = -5\text{V},$	$T_c = 50^{\circ}\text{C}$	30	A

Table 7 Characteristic values

Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_{SD}	$I_{SD} = 25\text{A},$ $V_{GS} = -5\text{V}$	$T_{vj} = 25^{\circ}\text{C}$	3.7		V
			$T_{vj} = 125^{\circ}\text{C}$	TBD		
			$T_{vj} = 175^{\circ}\text{C}$	3.5		
Peak Reverse Recovery Current	I_{rrm}	$I_{SD} = 25\text{A},$ $V_{DD} = 800\text{V},$ $V_{GS} = -4\text{V}$ $di/dt = 3296\text{A}/\mu\text{S}$	$T_{vj} = 25^{\circ}\text{C}$	44		A
			$T_{vj} = 125^{\circ}\text{C}$	TBD		
			$T_{vj} = 175^{\circ}\text{C}$	TBD		
Recovered Charge	Q_{rr}		$T_{vj} = 25^{\circ}\text{C}$	TBD		μC
			$T_{vj} = 125^{\circ}\text{C}$	TBD		
			$T_{vj} = 175^{\circ}\text{C}$	353		
	E_{rec}		$T_{vj} = 25^{\circ}\text{C}$	TBD		mJ

4 NTC-Thermistor

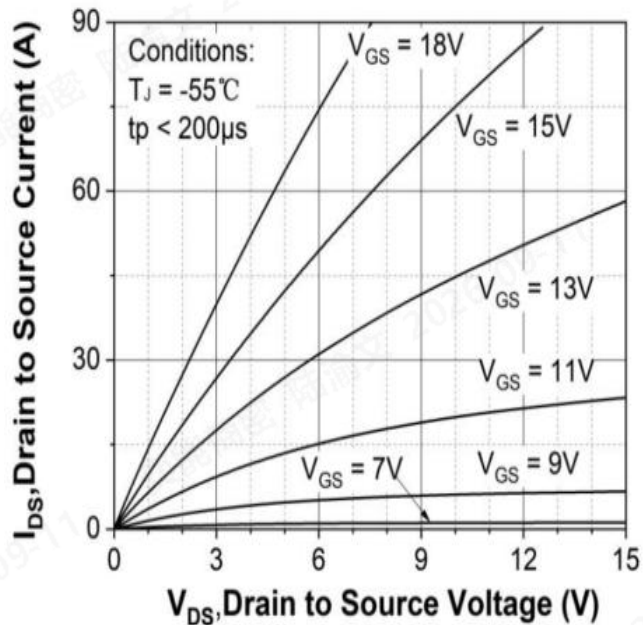
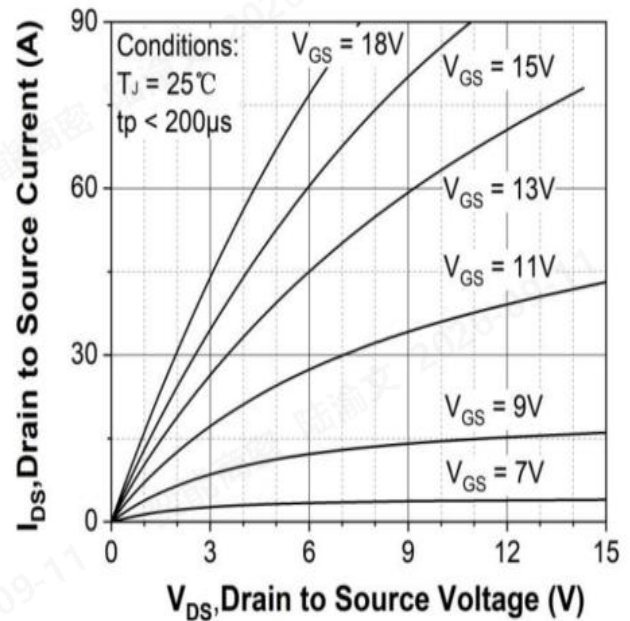
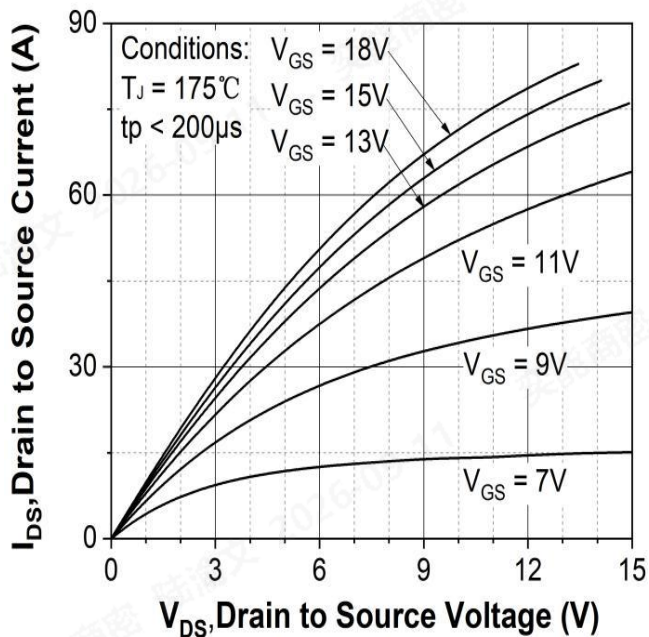
Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Reverse Recovery Energy		$T_{vj} = 125^{\circ}\text{C}$		TBD		
		$T_{vj} = 175^{\circ}\text{C}$		TBD		

4 NTC-Thermistor

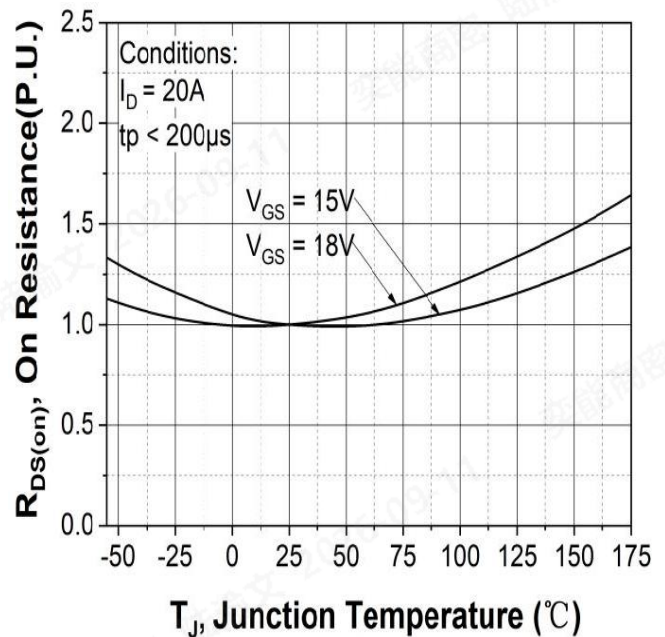
Parameter	Symbol	Note or test condition	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}	$T_{NTC} = 25^{\circ}\text{C}$		5		$\text{k}\Omega$
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100^{\circ}\text{C}$, $R_{100} = 488\Omega$	-3		3	%
Power Dissipation	P_{25}	$T_{NTC} = 25^{\circ}\text{C}$			20	mW
β -value	$\beta_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15\text{K}))]$		3375		K
β -value	$\beta_{25/85}$	$R_2 = R_{25} \exp[B_{25/85}(1/T_2 - 1/(298,15\text{K}))]$		3411		K
β -value	$\beta_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15\text{K}))]$		3433		K

5 Characteristic diagram

5 Characteristic diagram

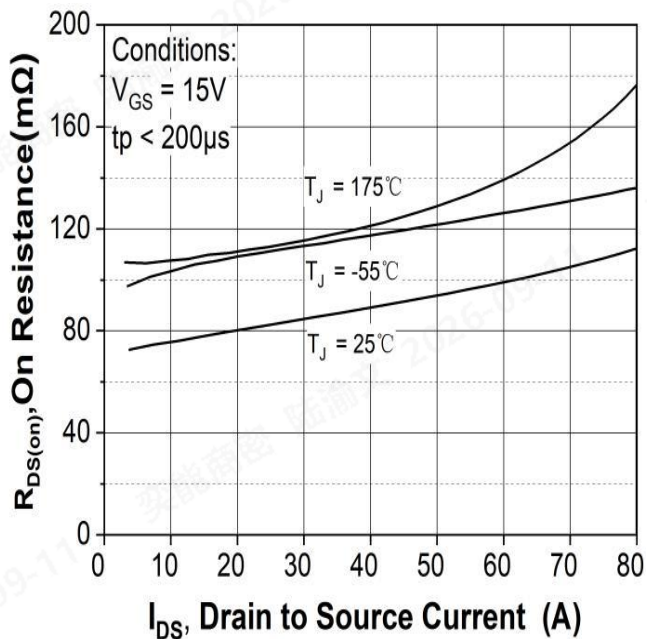
Output characteristics $T_J = -55^{\circ}\text{C}$ Output characteristics $T_J = 25^{\circ}\text{C}$ Output characteristics $T_J = 175^{\circ}\text{C}$ 

Normalized on-resistance vs. temperature

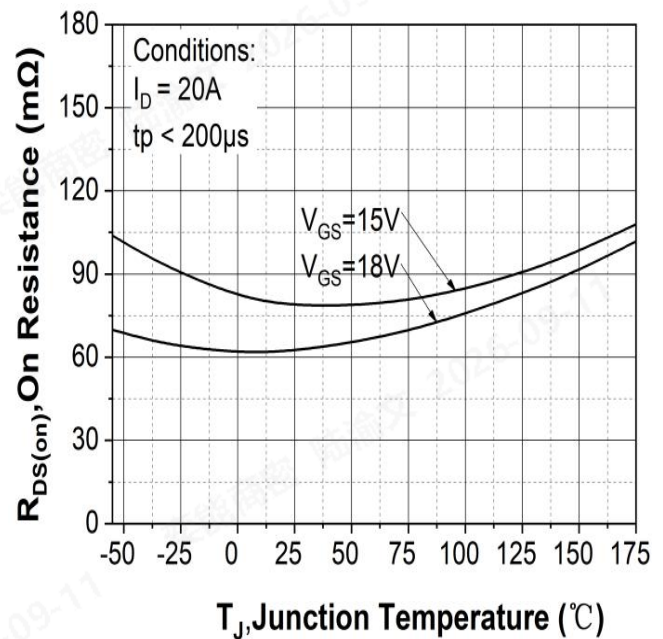


5 Characteristic diagram

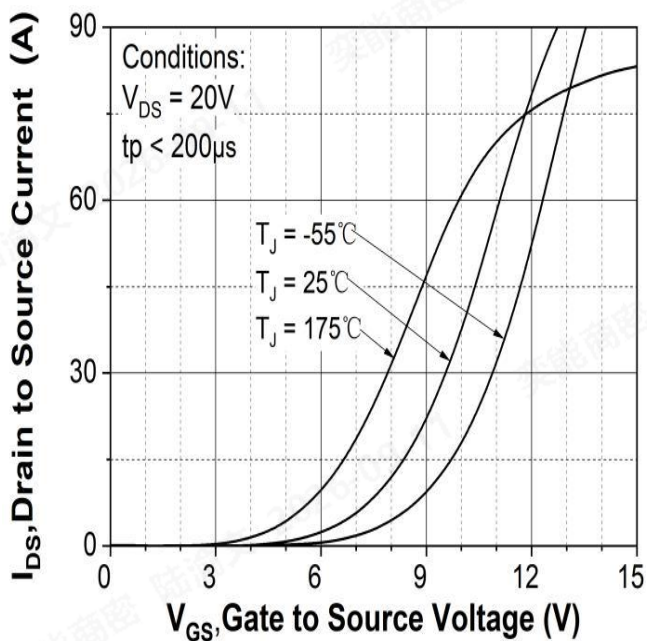
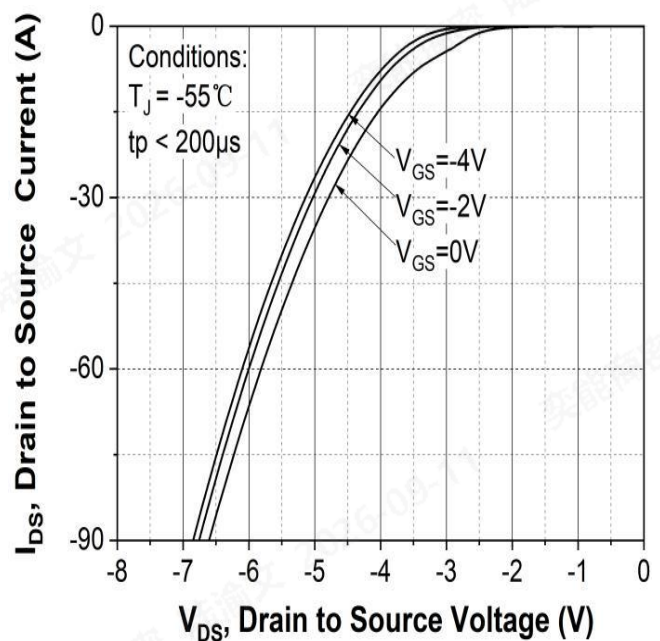
On-resistance vs. drain current for various temperatures



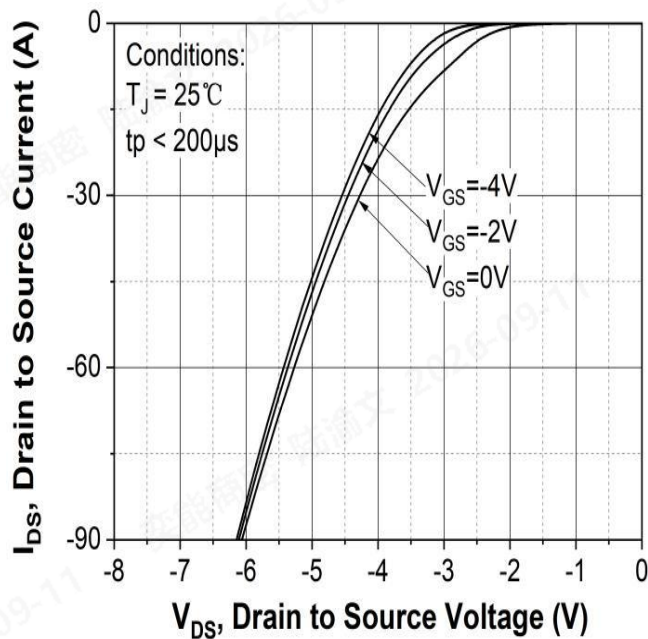
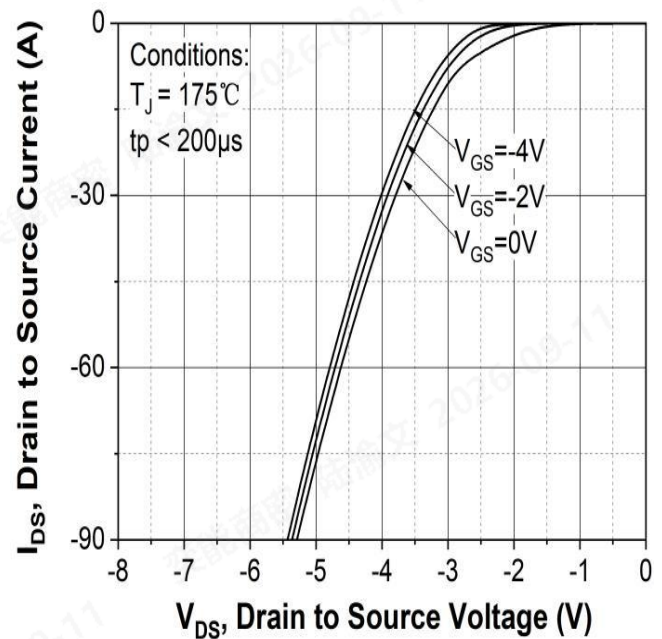
On-resistance vs. temperature for various gate voltage



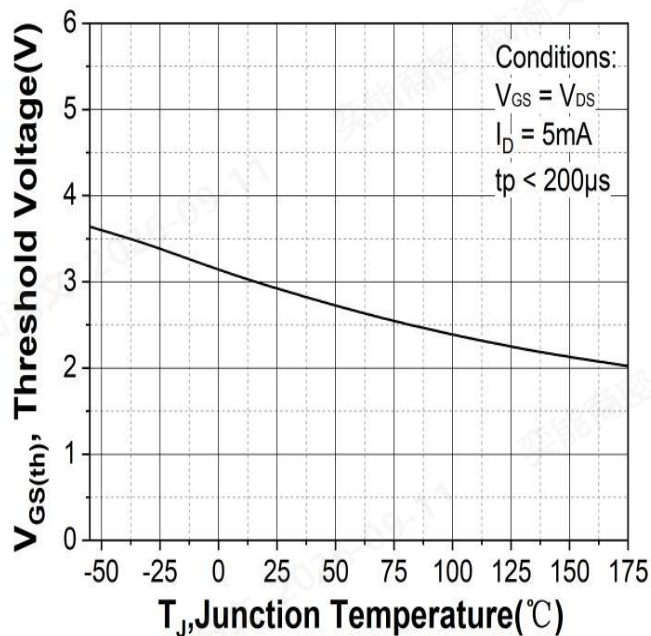
Transfer characteristic for various junction temperatures

Body diode characteristic at $T_J = -55^\circ C$ 

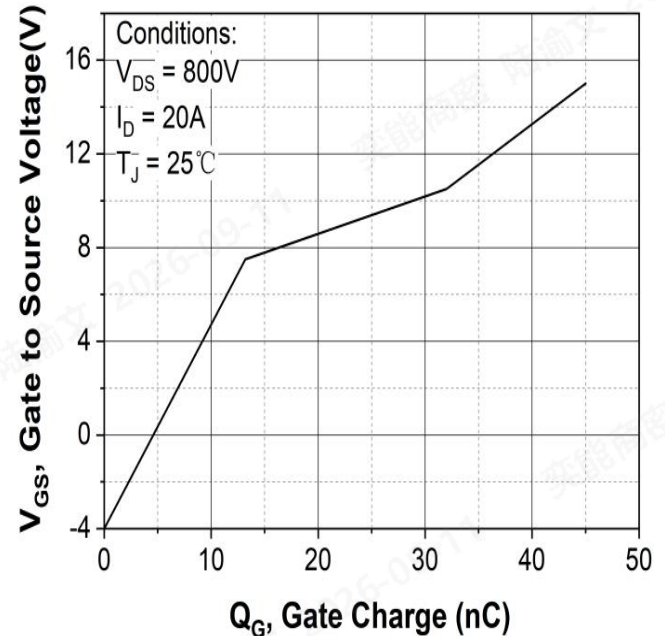
5 Characteristic diagram

Body diode characteristic at $T_J = 25^\circ\text{C}$ Body diode characteristic at $T_J = 175^\circ\text{C}$ 

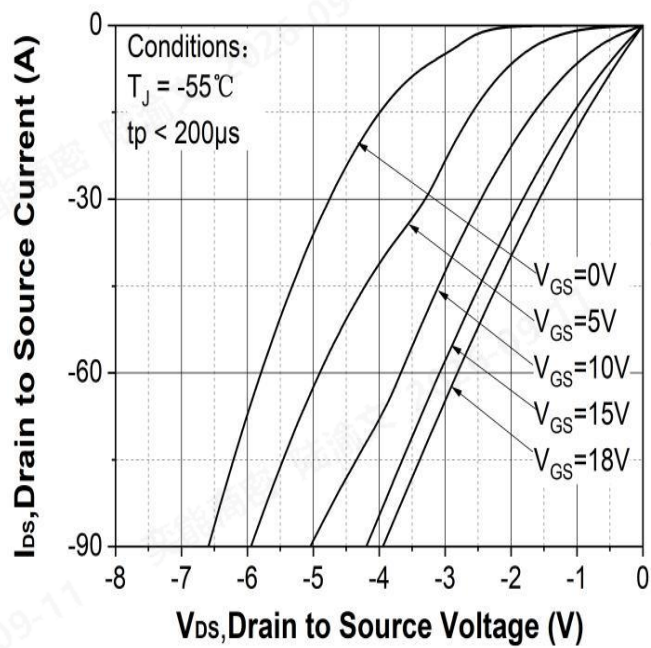
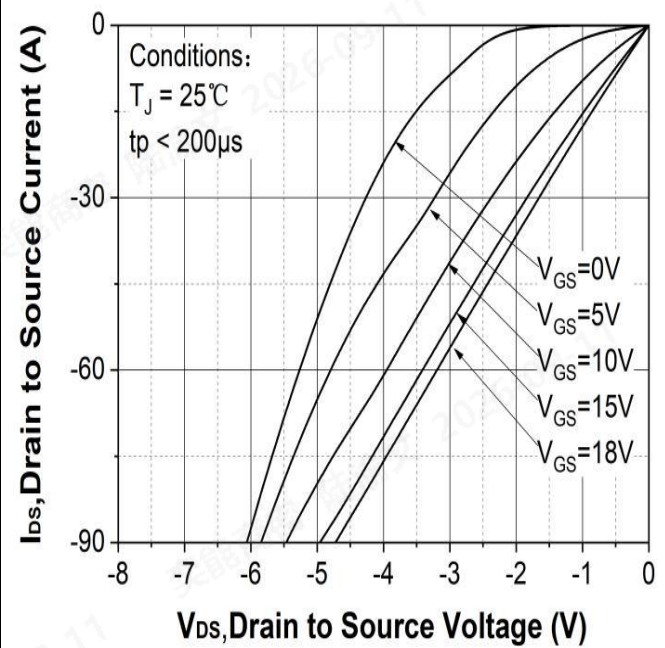
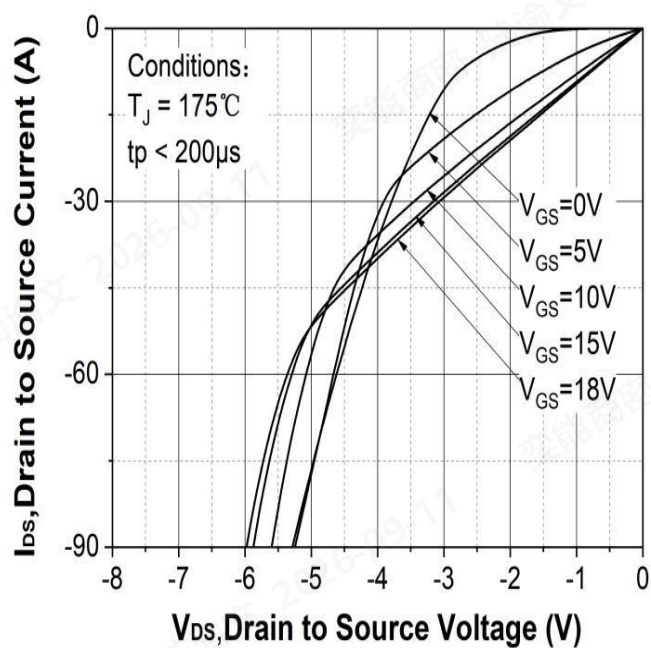
Threshold voltage vs. temperature



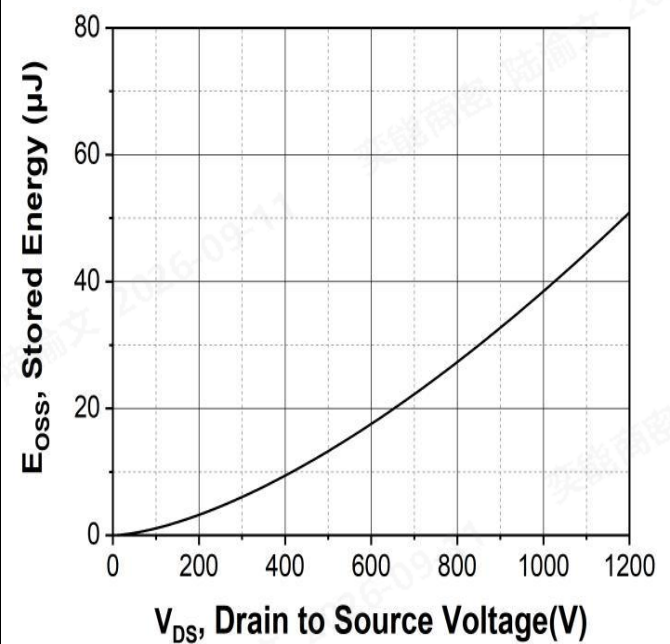
Gate charge characteristic



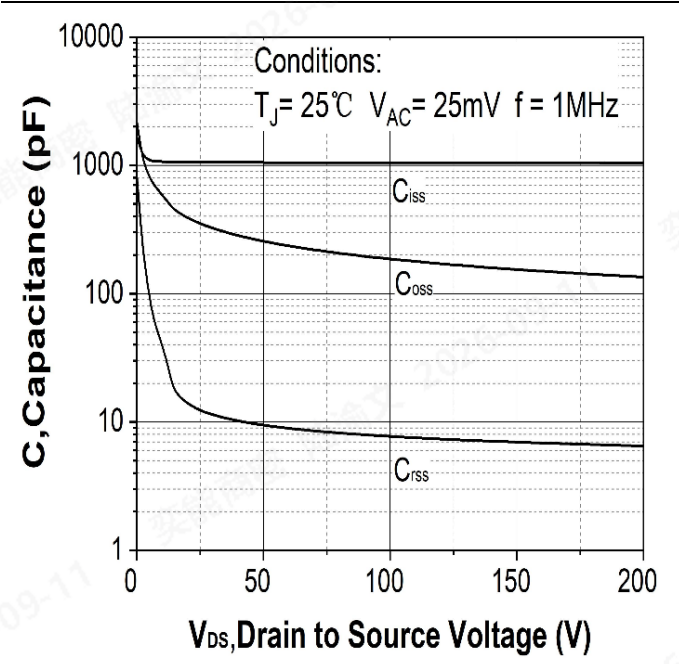
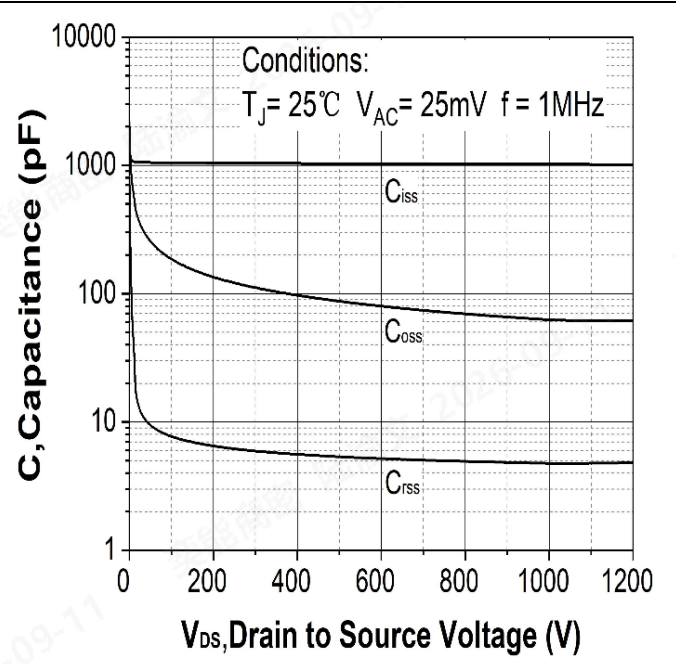
5 Characteristic diagram

3rd quadrant characteristic at $T_J = -55^\circ\text{C}$ 3rd quadrant characteristic at $T_J = 25^\circ\text{C}$ 3rd quadrant characteristic at $T_J = 175^\circ\text{C}$ 

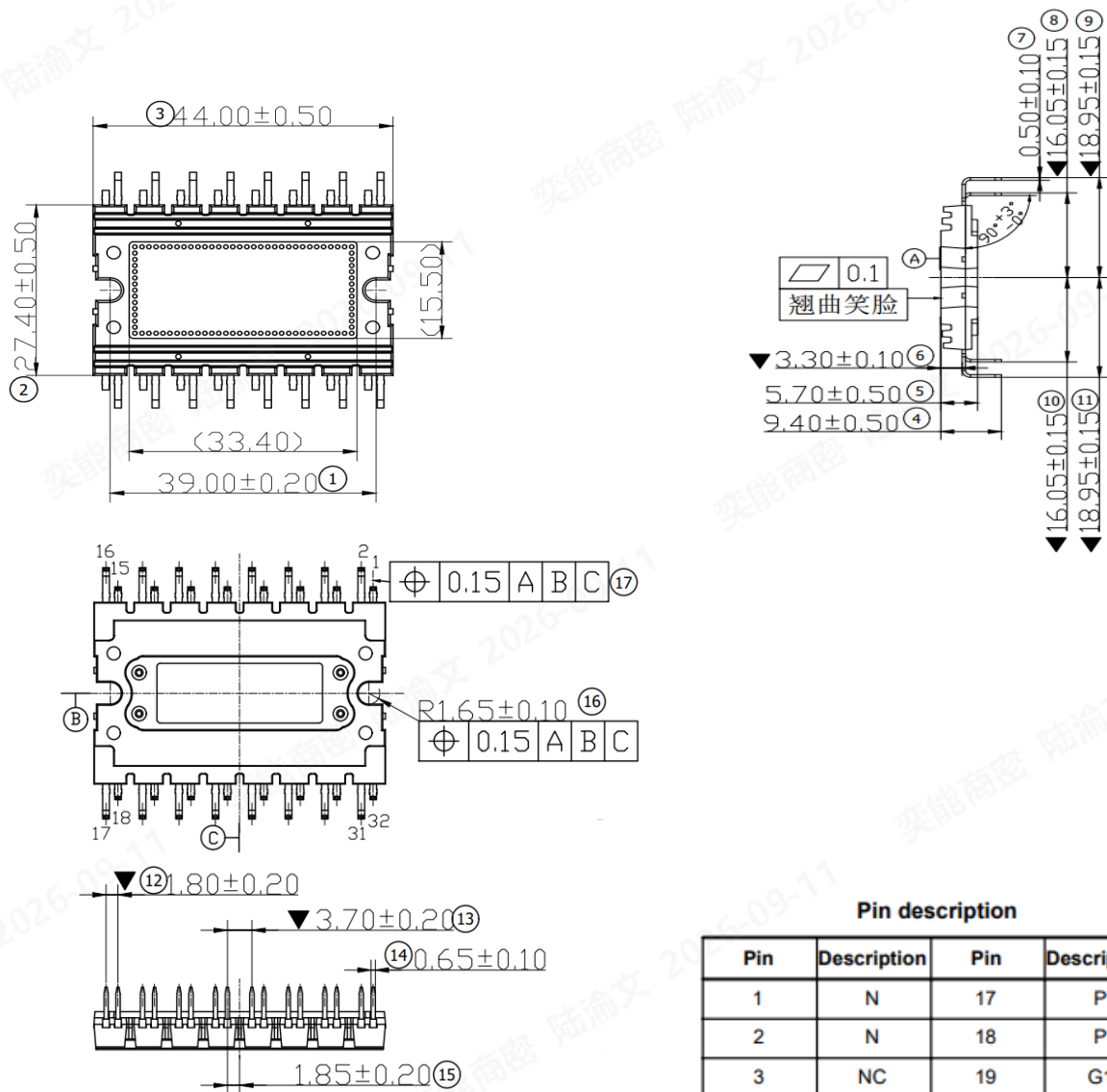
Output capacitor stored energy



5 Characteristic diagram

Capacitances vs. drain-source voltage (0 - 200V) 	Capacitances vs. drain-source voltage (0 - 1200V) 
Transient thermal impedance as a function of pulse width	NTC-Thermistor-temperature characteristic (typical)

6 Package outlines



AM120R750M1S-Preliminary

INNO APM Module

innoevsic

Revision history

Revision history

Document revision	Date of release	Description of changes
1.1	2026-08-05	Update material
1.0	2026-05-28	Preliminary version

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