



SMP9N90-S

900V N-Channel MOSFET

● Features:

■ 9.0A, 900V, $R_{DS(on)(Typ)} = 1.2\Omega @ V_{GS}=10V$

■ Low Gate Charge

■ Low C_{rss}

■ 100% Avalanche Tested

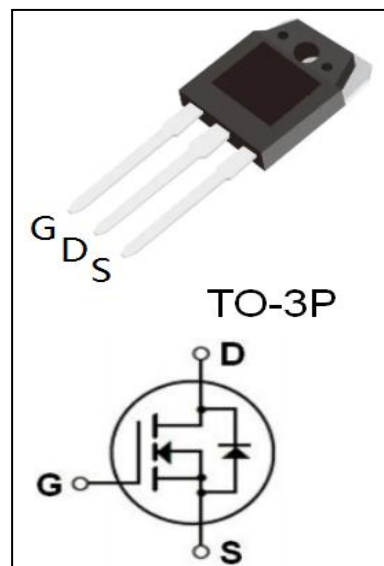
■ Fast Switching

■ Improved dv/dt Capability

● Application:

■ High Frequency Switching Mode Power Supply

■ Active Power Factor Correction



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	900	V
I_D	Drain Current - Continuous($T_c=25^\circ\text{C}$) - Continuous($T_c=100^\circ\text{C}$)	9.0*	A
		5.7*	A
I_{DM}	Drain Current -Pulsed (Note1)	36.0*	A
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Limit Reference Value) (Note2)	673	mJ
I_{AR}	Avalanche Current (Note1)	7.0	A
dv/dt	Peak Diode Recovery dv/dt (Note3)	4.5	V/ns
P_D	Power Dissipation($T_c = 25^\circ\text{C}$) -Derate above 25°C	150	W
		1.2	W/ $^\circ\text{C}$
T_j	Operating Junction Temperature	150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

* Drain Current Limited by Maximum Junction Temperature.

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	$^\circ\text{C} / \text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	50	$^\circ\text{C} / \text{W}$

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Electrical Characteristics(Tc=25°C unless otherwise noted)

Symbol	Parameter	Test Conditons	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-source Breakdown Voltage	V _{GS} =0V ,I _D =250μA	900	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =900V,V _{GS} =0V	--	--	1	μA
		V _{DS} =720V,T _c =125°C	--	--	20	μA
I _{GSSF}	Gate-Body Leakage Current,Forward	V _{GS} =+30V, V _{DS} =0V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current,Reverse	V _{GS} =-30V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10 V, I _D =4.5A	--	1.2	1.5	Ω
g _{FS}	Forward Transconductance	V _{DS} =20 V, I _D =4.5A (Note4)	--	7.2	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V,V _{GS} =0V, f=1.0MHz	--	1700	--	pF
C _{oss}	Output Capacitance		--	143	--	pF
C _{rss}	Reverse Transfer Capacitance		--	7.3	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 450 V, I _D = 9 A, R _G = 25 Ω (Note4,5)	--	28	--	ns
t _r	Turn-On Rise Time		--	41	--	ns
t _{d(off)}	Turn-Off Delay Time		--	113	--	ns
t _f	Turn-Off Fall Time		--	49	--	ns
Q _g	Total Gate Charge	V _{DS} = 720 V, I _D =9 A, V _{GS} = 10 V (Note4,5)	--	38.5	--	nC
Q _{gs}	Gate-Source Charge		--	11.2	--	nC
Q _{gd}	Gate-Drain Charge		--	13.3	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	9	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	36	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V,I _S =9 A	--	--	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =9 A,	--	651	--	ns
Q _{rr}	Reverse Recovery Charge	d I _F /dt=100A/μs (Note4)	--	5.4	--	μC

Notes:

- 1、Repetitive Rating:Pulse Width Limited by Maximum Junction Temperature.
- 2、 $L=25mH, I_{AS}=7.0A, V_{DD}=100V, R_G=25\Omega$, Starting $T_J=25^\circ C$.
- 3、 $I_{SD}\leq 9.0A, di/dt\leq 200A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ C$.
- 4、Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 5、Essentially Independent of Operating Temperature.

Typical Performance Characteristics

Fig 1. On-Regin Characteristics

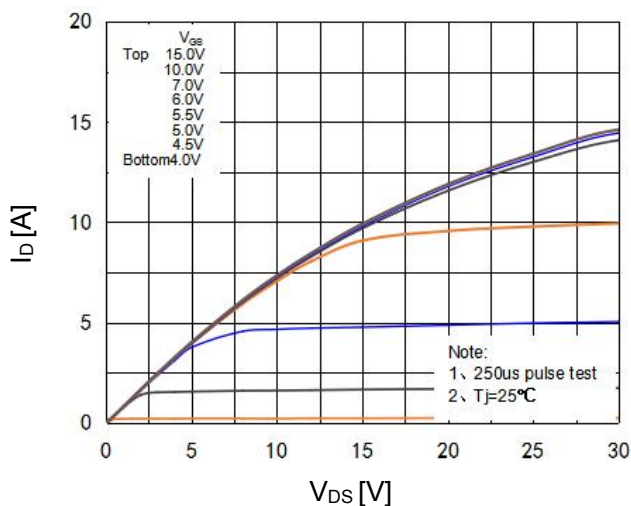


Fig 2. Transfer Characteristics

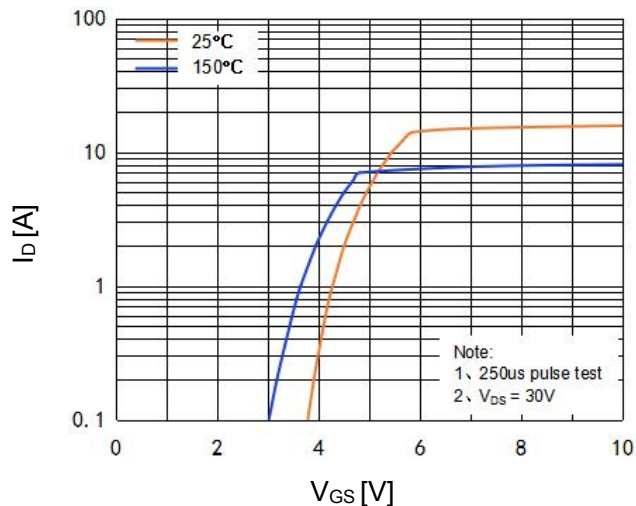


Fig 3. On-Resistance Variation vs. Drain Current and Gate Voltage

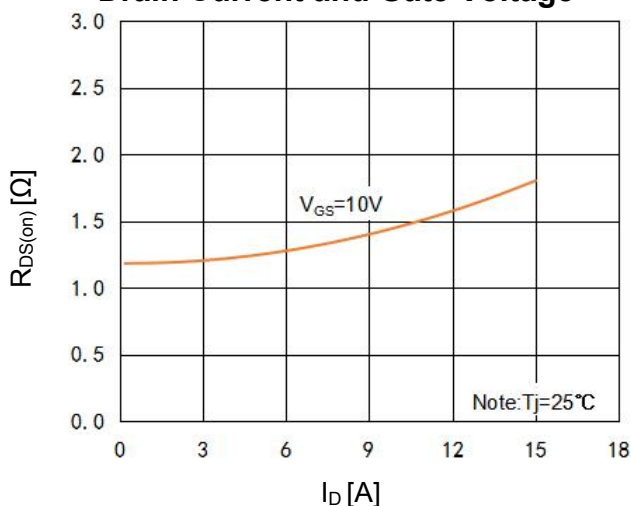


Fig 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

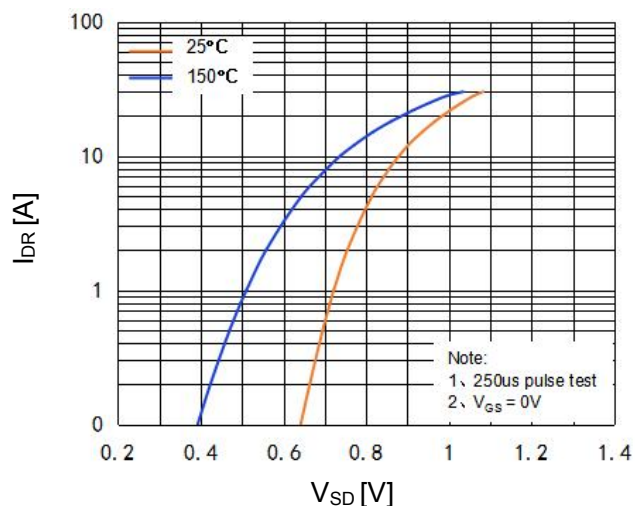


Fig 5. Capacitance Characteristics

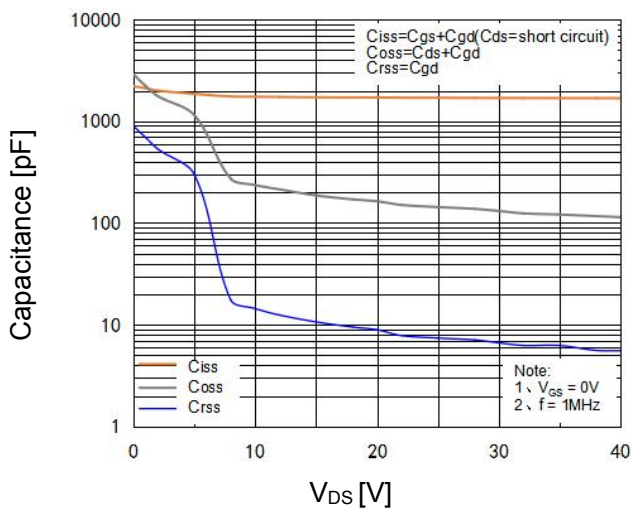


Fig 6. Gate Charge Characteristics

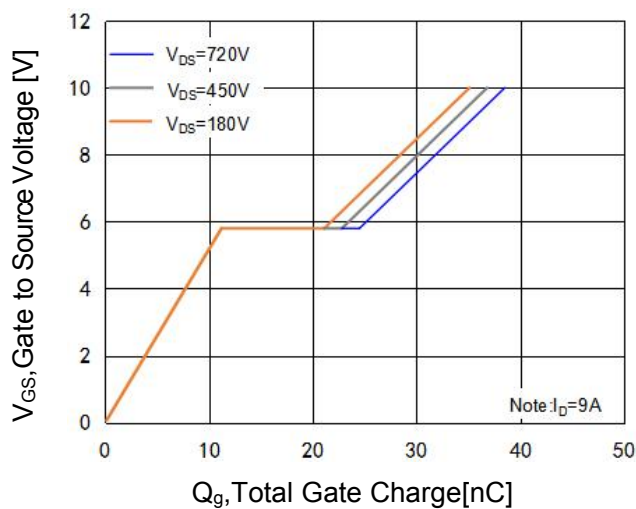


Fig 7. Breakdown Voltage Variation vs. Temperature

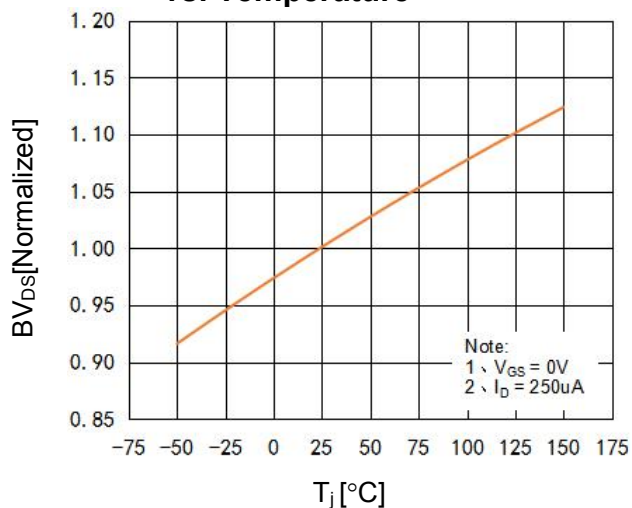


Fig 8. On-Resistance Variation vs. Temperature

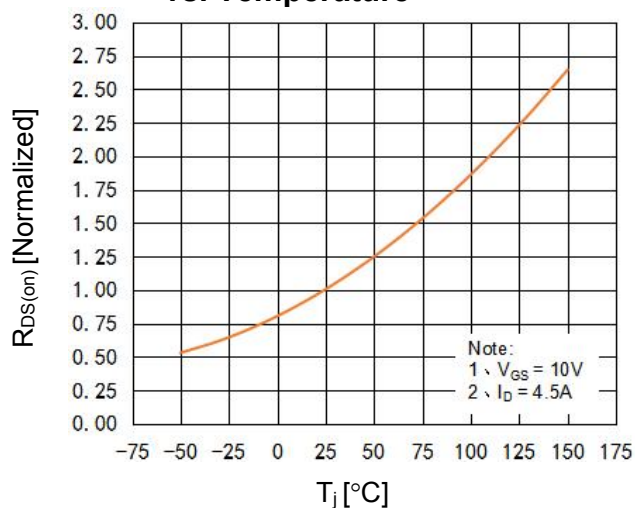


Fig 9. Maximum Safe Operating Area

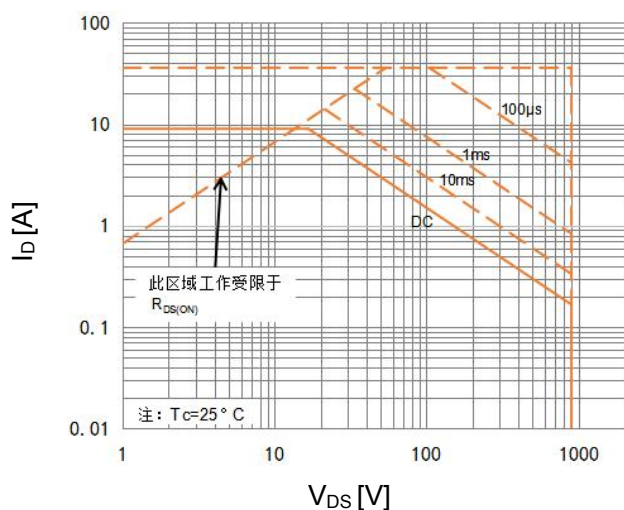
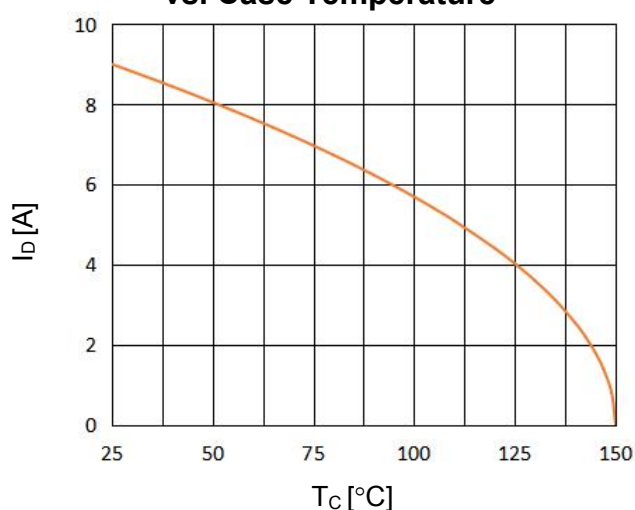


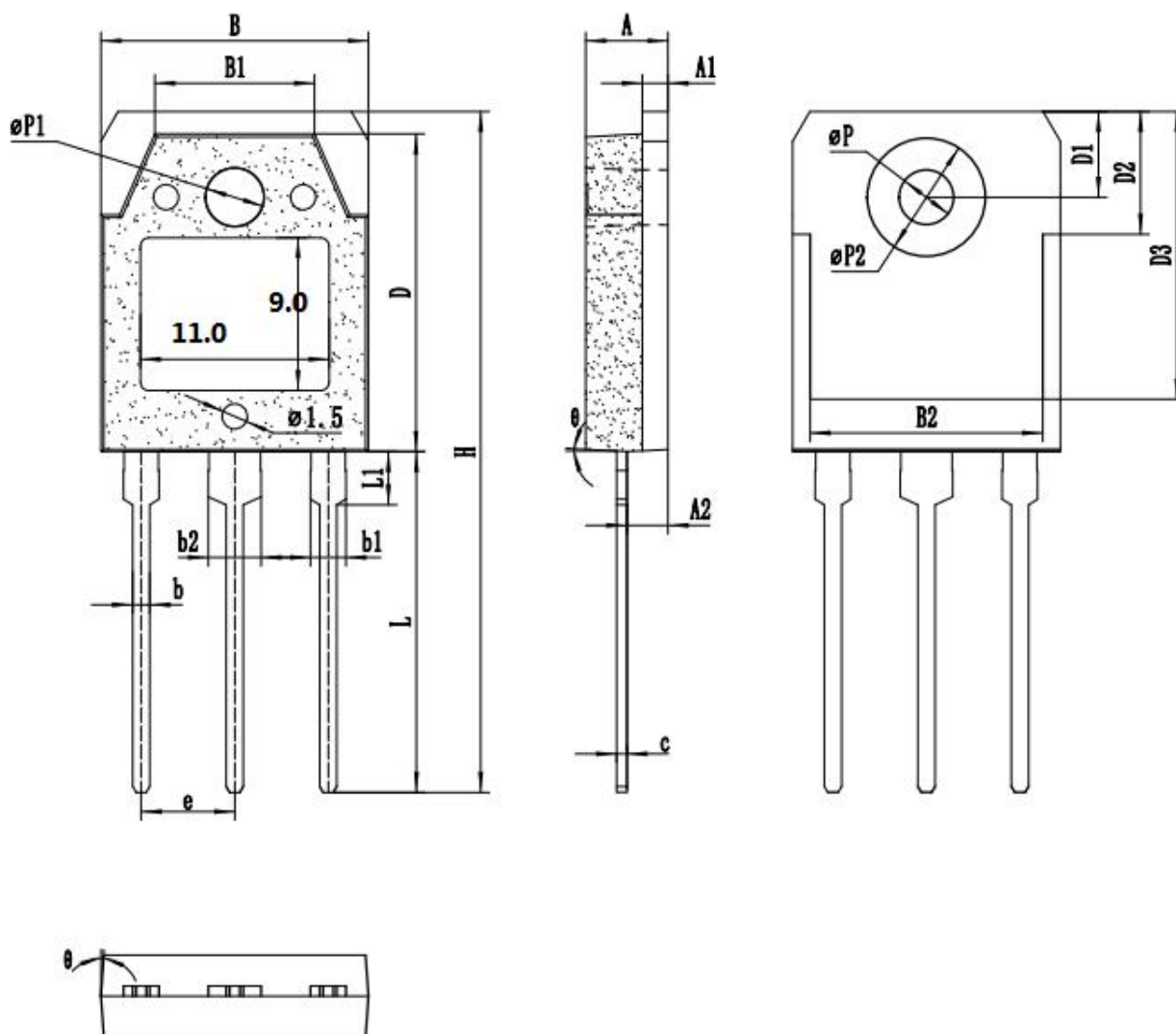
Fig 10. Maximum Drain Current vs. Case Temperature



TO-3P Package Dimensions

UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.50	4.80	5.10	D	18.00	18.50	19.00
A1	1.40	1.50	1.60	D1	4.60	5.00	5.40
A2	2.10	2.40	2.70	D2	6.70	7.10	7.50
b	0.80	1.00	1.20	D3	16.20	16.70	17.20
b1	1.90	2.10	2.30	L1	2.70	3.10	3.50
b2	2.90	3.10	3.30	L	19.20	20.20	21.20
e		5.45		H	38.40	39.90	41.40
B	15.20	15.70	16.20	ΦP	2.90	3.15	3.40
B1	9.10	9.40	9.70	ΦP1	3.15	3.40	3.65
B2	13.20	13.60	14.00	ΦP2	6.70	7.00	7.30
c	0.50	0.60	0.70	θ	3°	5°	7°



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- 注意事项：
- 1、在电路设计时请不要超过器件的最大额定值，否则会影响整机的可靠性。
 - 2、MOSFET产品为静电敏感型器件，使用时应注意采取防静电保护措施，如佩戴防静电手环、设备接地等。
 - 3、如需安装散热片，请注意控制扭力大小及散热片的平整度。
 - 4、该规格书由华科公司制作，并可能不定期更改，恕不另行通知。
 - 5、如有疑问，请及时联系我司销售代表。

版本履历表：

序号	版本号	修改时间	修改记录
1	V1.0	2024-1-10	首次发行