CMN4012S9

N-Channel 40V(D-S) Power MOSFET

Description

CMN4012S9 is the N-Channel enhancement mode power field effect transistors with high cell density, trench technology. This high density process and design have been optimized switching performance and especially tailored to minimize on-state resistance.

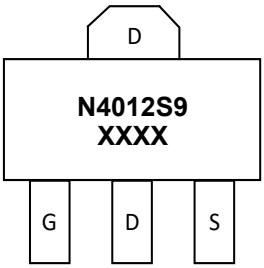
Features

- V_{DS}: 40V
- I_D: 23.6A
- $R_{DS_{ON}}$ ($@V_{GS}$=10V) : < 15mΩ
- $R_{DS_{ON}}$ ($@V_{GS}$=4.5V) : < 23mΩ
- High density cell design for extremely low $R_{DS_{ON}}$
- Excellent on-resistance and DC current capability

Applications

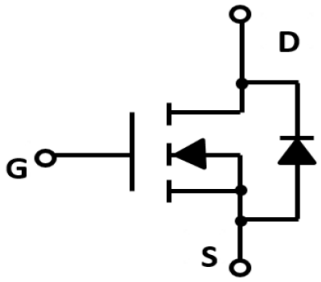
- Cellular Handsets and Accessories
- Personal Digital Assistants
- Portable Instrumentation
- Load switch

Marking Information

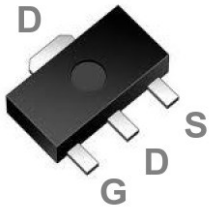


Device Code = N4012S9
Date Code = XXXX

Equivalent Circuit and Pin Configuration



SOT-89 (Top View)



Ordering Information

Part Number	Packaging	Reel Size
CMN4012S9	1000/Tape & Reel	7 inch

Absolute Maximum Ratings (T_A=25 ℃ unless otherwise noted)

Parameter		Symbol	Maximum	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	±20	V
Continuous Drain Current[1][6]	T_C=25°C	I_D	23.6	A
	T_C=70°C		19	
	T_A=25°C		9	
	T_A=70°C		7	
Pulsed Drain Current[3]		I_{DM}	36	A
Total Power Dissipation @ T_C=25°C [4]		P_D	12.5	W
Total Power Dissipation @ T_A=25°C [4]			1.8	
Thermal Resistance Junction-to-Ambient [2][5]		$R_{\theta JA}$	70	°C/W
Thermal Resistance Junction-to-Case		$R_{\theta JC}$	10	°C/W
Junction and Storage Temperature Range		T_J,T_{STG}	-55 to +150	°C

Electrical Characteristics (T_J=25 ℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V,T_C=25°C			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2		2.5	V
Static Drain-Source on-Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=10A		13	15	mΩ
		V_{GS}=4.5V,I_D=10A		15	23	
Diode Forward Voltage	V_{SD}	I_S=10A,V_{GS}=0V			1.2	V
Maximum Body-Diode Continuous Current	I_S				10	A
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V,f=1MHz		750		pF
Output Capacitance	C_{oss}			150		
Reverse Transfer Capacitance	C_{rss}			80		
Switching Parameters						
Total Gate Charge	Q_g	V_{GS}=10V,V_{DS}=20V,I_D=10A		15		nC
Gate Source Charge	Q_{gs}			3		
Gate Drain Charge	Q_{gd}			2.5		
Turn-on Delay Time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=20V, I_D=2A,R_{GEN}=3Ω,R_L=1Ω		6		ns
Turn-on Rise Time	t_r			17		
Turn-off Delay Time	$t_{D(off)}$			29		
Turn-off Fall Time	t_f			17		

Noted: (1) Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.

(2) Performed on 40mmx40mmx1.5mm epoxy FR4 PCB with 6cm 2(one layer, 70μm thick) copper area for drain connection. PCB is vertical Without blown air.

(3) Single pulse width limited by junction temperature $T_{J(MAX)}$ = 150°C.

(4) The power dissipation PD is based on $T_{J(MAX)}$ = 150°C,using junction-to-case thermal resistance, and is more useful in setting the upper Dissipation limit for cases where additional heatsinking is used.

(5) The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JA}$ and case to ambient.

(6) The maximum current rating is package limited.

Typical Performance Characteristics

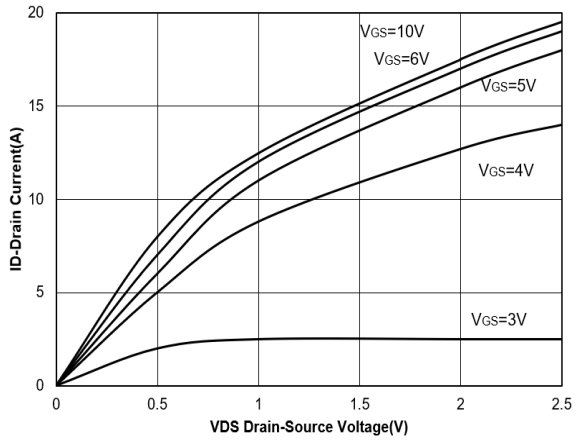


Figure 1. Output Characteristics

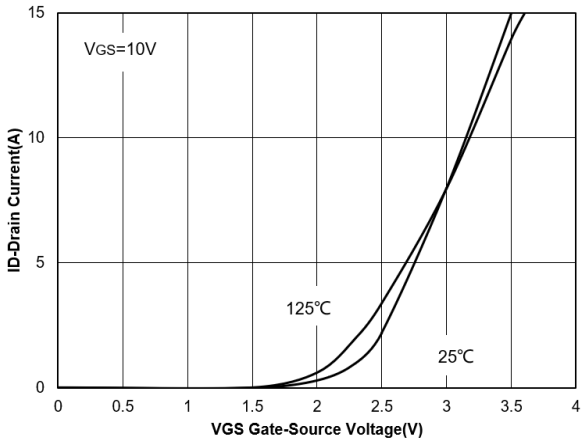


Figure 2. Transfer Characteristics

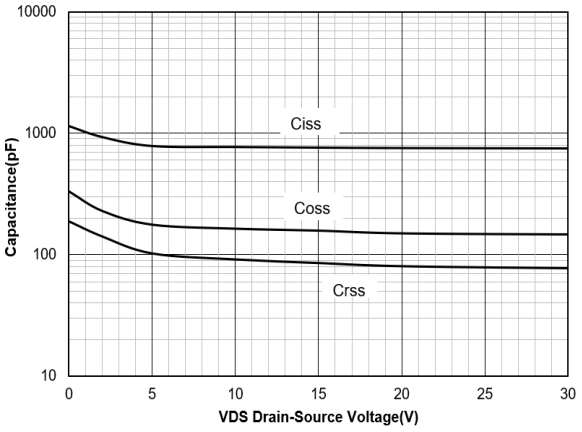


Figure 3. Capacitance Characteristics

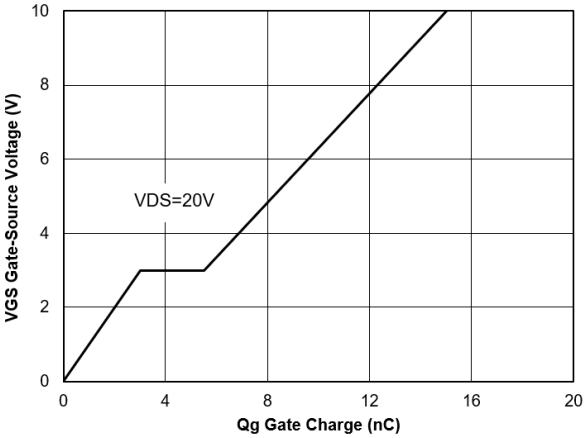


Figure 4. Gate Charge

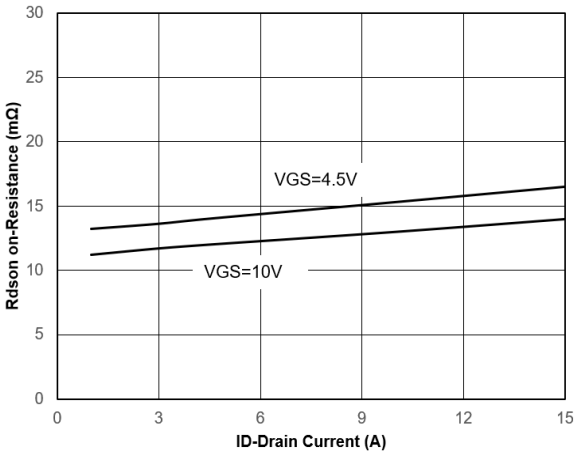


Figure 5. Drain-Source on Resistance

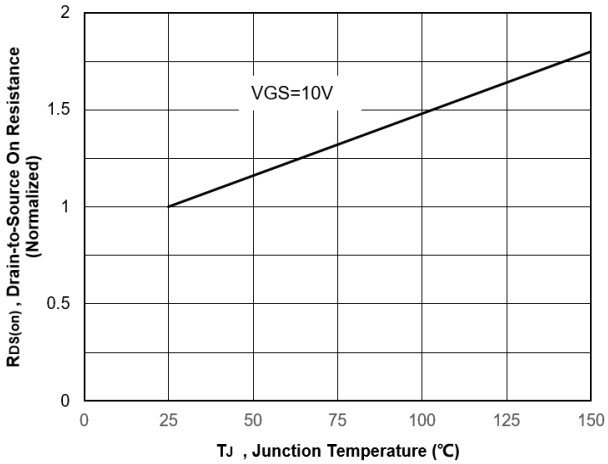


Figure 6. Normalized On-Resistance Vs. Temperature

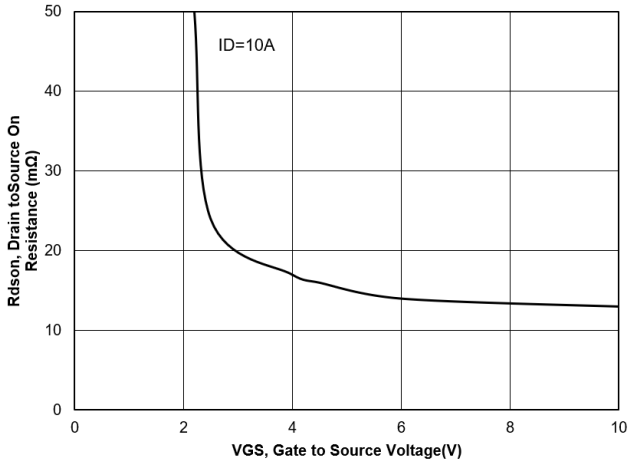


Figure 7. Typical Drain to Source ON Resistance VS Gate Voltage and Drain Current

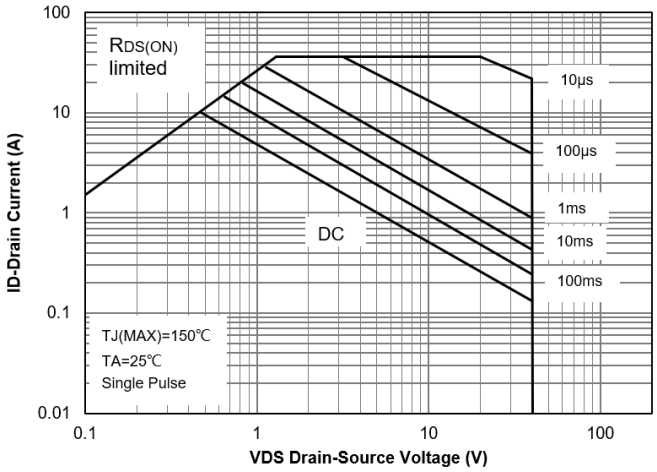


Figure 8. Safe Operation Area

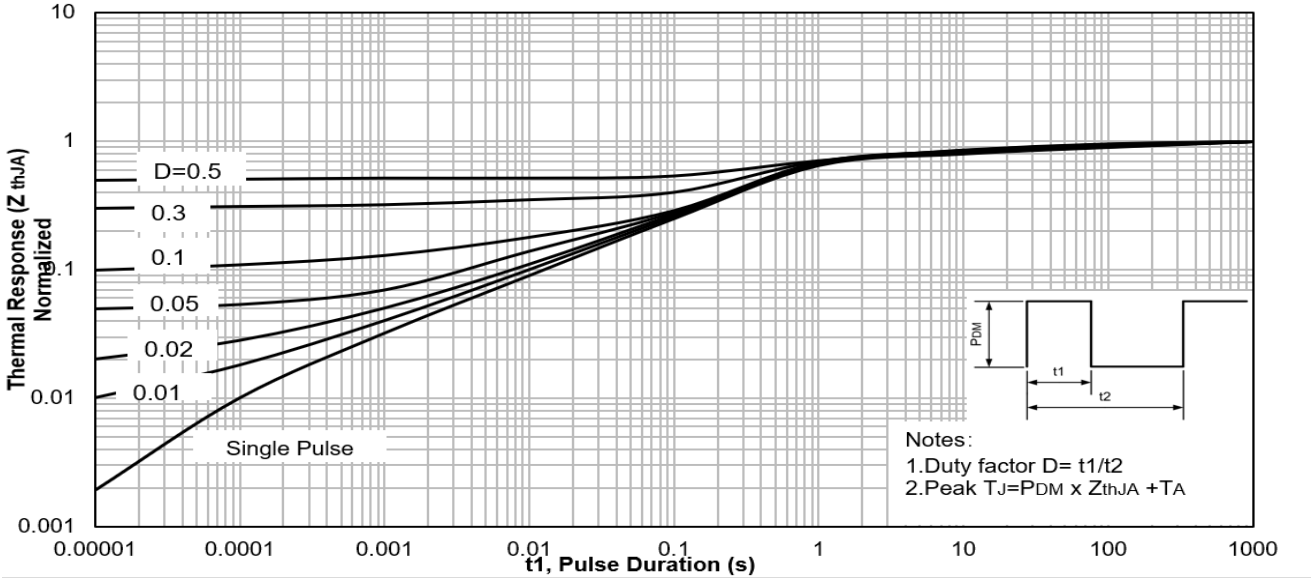


Figure 9. Maximum Effective Transient Thermal Impedance ,Junction-to-Ambient

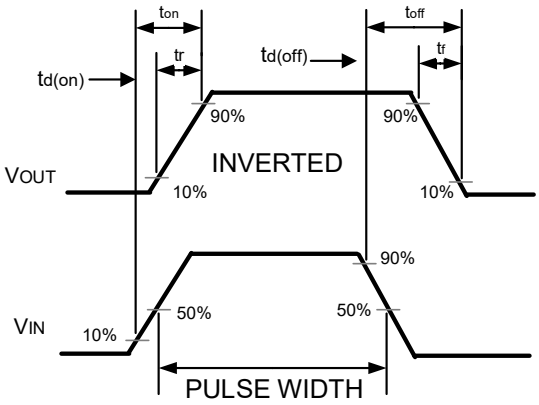
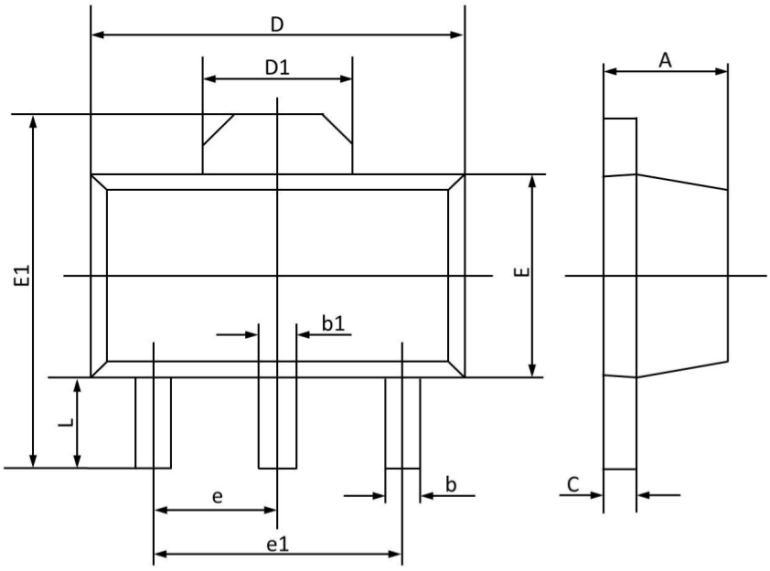


Figure 10. Switching wave

SOT-89 Package Outline Drawing



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.400	- -	1.600	0.055	- -	0.063
b	0.320	- -	0.520	0.013	- -	0.020
b1	0.400	- -	0.580	0.016	- -	0.041
c	0.350	- -	0.440	0.014	- -	0.017
D	4.400	- -	4.600	0.173	- -	0.181
D1	1.550 REF			0.061 REF		
E	2.300	- -	2.600	0.091	- -	0.102
E1	3.940	- -	4.250	0.155		0.167
e	1.500 TYP			0.060 TYP		
e1	3.000 TYP			0.118 TYP		
L	0.900	- -	1.200	0.035	- -	0.047

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