

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.

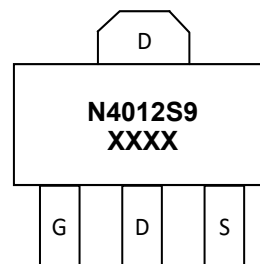
Features

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

Applications

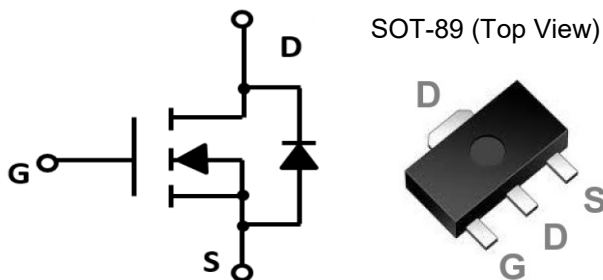
- Cellular Handsets and Accessories
- Personal Digital Assistants
- Portable Instrumentation
- Load switch

Marking Information



Device Code = N4012S9
 Date Code = XXXX

Equivalent Circuit and Pin Configuration



Ordering Information

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

Absolute Maximum Ratings (TA=25 °C 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 _{θJA}	70	°C/W
Thermal Resistance Junction-to-Case		R _{θJC}	10	°C/W
Junction and Storage Temperature Range		T _J ,T _{STG}	-55 to +150	°C

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BVDSS	VGS=0V,ID=250μA	40			V
Zero Gate Voltage Drain Current	IDSS	VDS=40V,VGS=0V,Tc=25°C			1	μA
Gate-Body Leakage Current	IGSS	VGS=±20V,VDS=0V			±100	nA
Gate Threshold Voltage	VGS(th)	VDS=VGS,ID=250μA	1.2		2.5	V
Static Drain-Source on-Resistance	RDS(on)	VGS=10V,ID=10A		13	15	mΩ
		VGS=4.5V,ID=10A		15	23	
Diode Forward Voltage	VSD	IS=10A,VGS=0V			1.2	V
Maximum Body-Diode Continuous Current	IS				10	A
Dynamic Parameters						
Input Capacitance	Ciss	VDS=20V,VGS=0V,f=1MHz		750		pF
Output Capacitance	Coss			150		
Reverse Transfer Capacitance	Crss			80		
Switching Parameters						
Total Gate Charge	Qg	VGS=10V,VDS=20V,ID=10A		15		nC
Gate Source Charge	Qgs			3		
Gate Drain Charge	Qgd			2.5		
Turn-on Delay Time	tD(on)	VGS=10V,VDS=20V, ID=2A,RGEN=3Ω,RL=1Ω		6		ns
Turn-on Rise Time	tr			17		
Turn-off Delay Time	tD(off)			29		
Turn-off Fall Time	tf			17		

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

- (2) Performed on 40mmx40mmx1.5mm epoxy FR4 PCB with 6cm² (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 P_D 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_{θJA} is the sum of the thermal impedance from junction to case R_{θJA} and case to ambient.
- (6) The maximum current rating is package limited.

Typical Performance Characteristics

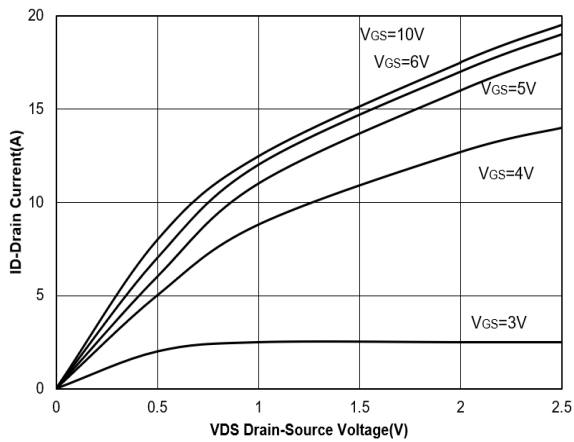


Figure 1. Output Characteristics

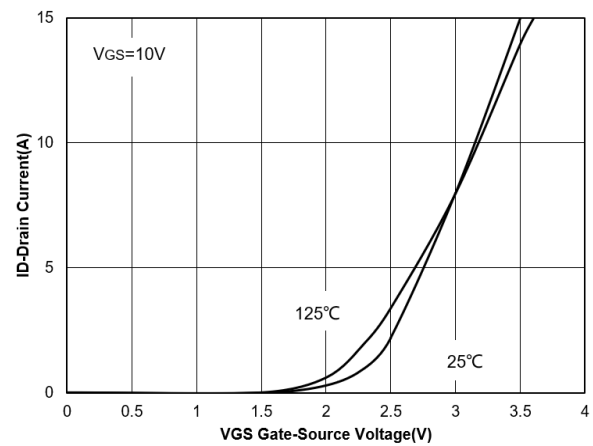


Figure 2. Transfer Characteristics

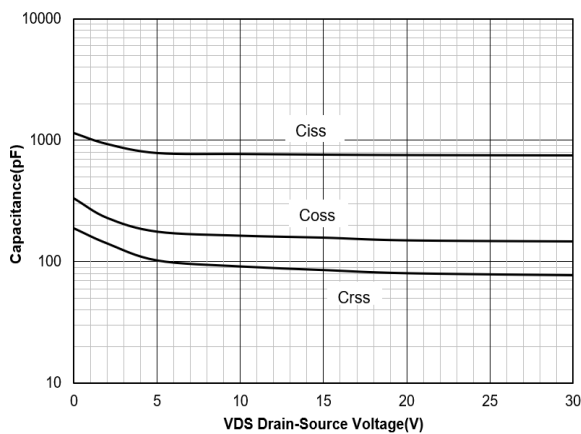


Figure 3. Capacitance Characteristics

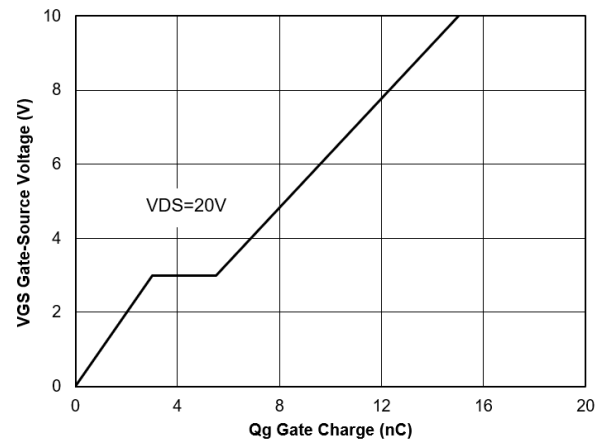


Figure 4. Gate Charge

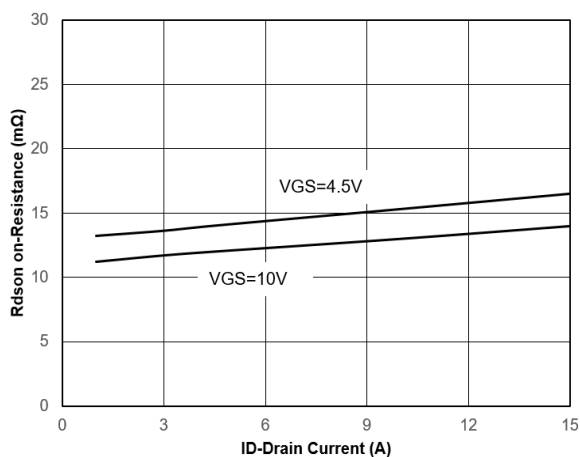


Figure 5. Drain-Source on Resistance

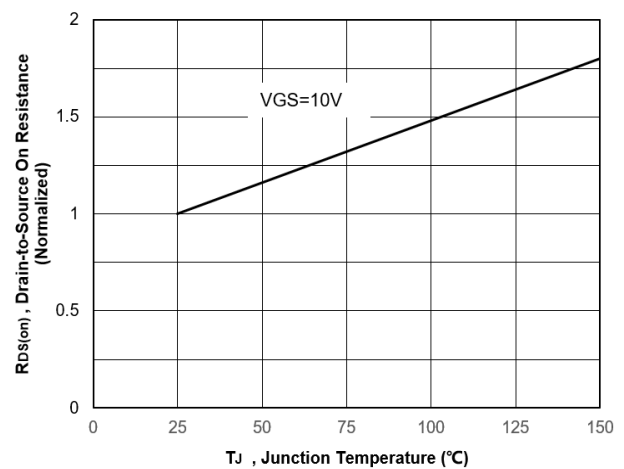


Figure 6. Normalized On-Resistance Vs. Temperature

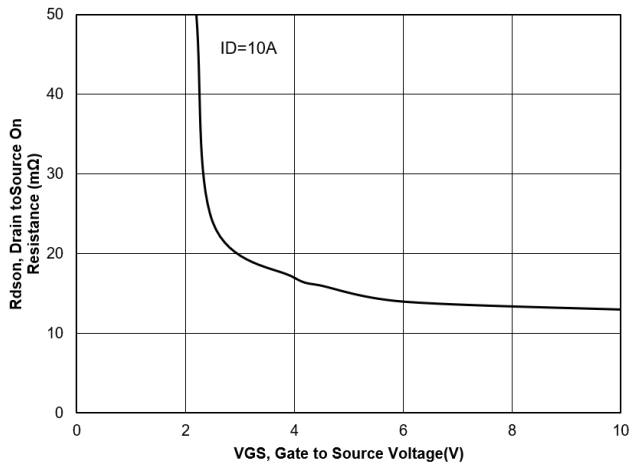


Figure 7. Typical Drain to Source ON Resistance VS Gate Voltage and Drain Current

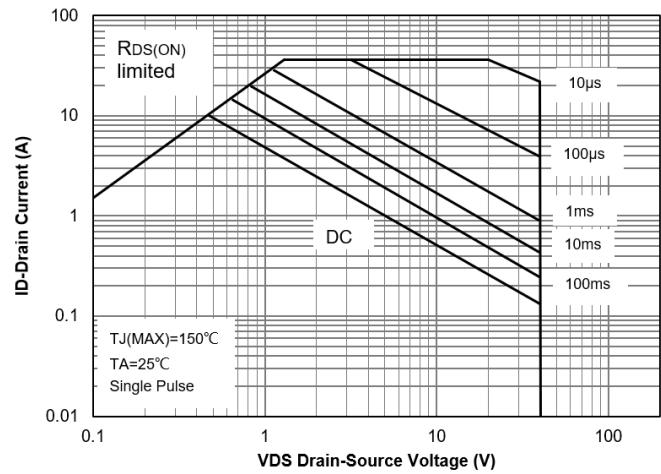


Figure 8. Safe Operation Area

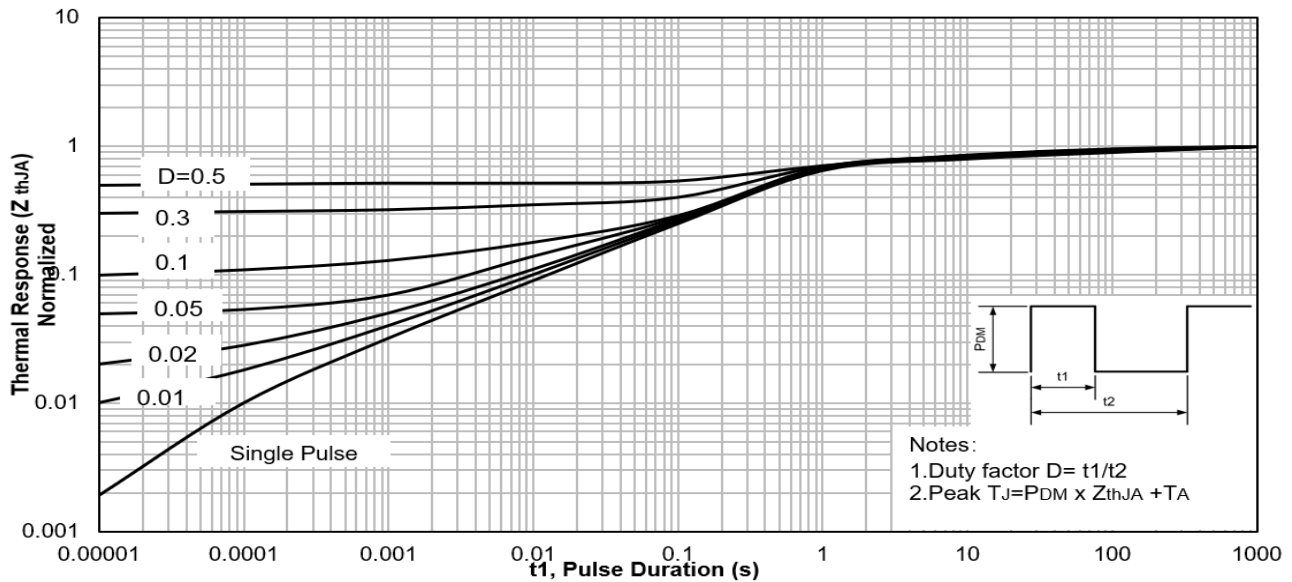


Figure 9. Maximum Effective Transient Thermal Impedance ,Junction-to-Ambient

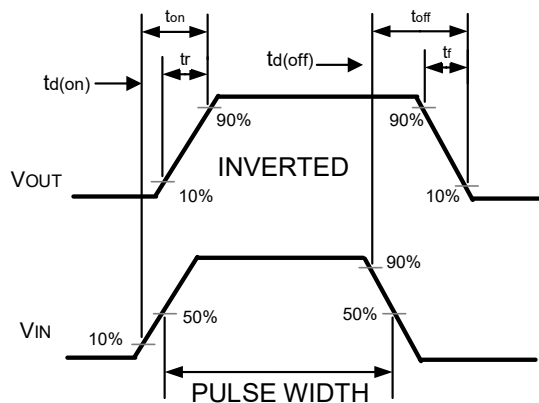
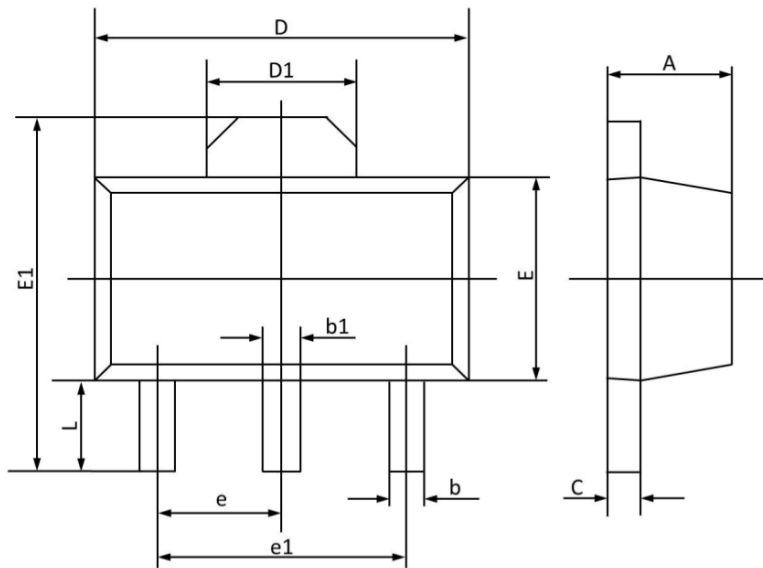


Figure 10. Switching wave

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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