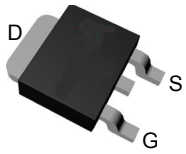
SM1A24NSU

N-Channel Enhancement Mode MOSFET

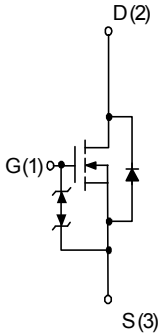
Features

- 100V/12A,
  $R_{DS(ON)}$= 120mΩ(max.) @ V_{GS}= 10V
  $R_{DS(ON)}$= 135mΩ(max.) @ V_{GS}= 4.5V
- Reliable and Rugged
- Lead Free and Green Devices Available
  (RoHS Compliant)

Pin Description



Top View of TO-252



N-Channel MOSFET

Applications

- Power Management in DC/DC Converter.

Ordering and Marking Information

SM1A24NS □□-□□ □ Assembly Material Handling Code Temperature Range Package Code	Package Code U : TO-252 Operating Junction Temperature Range C : -55 to 150 °C Handling Code TR : Tape & Reel (2500ea/reel) Assembly Material G : Halogen and Lead Free Device
SM1A24NS U : SM1A24N XXXXX	XXXXX - Lot Code

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		100	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current	T_C=25°C	6	A
I_D	Continuous Drain Current	T_C=25°C	12	
		T_C=100°C	7.6	
I_{DM} [a]	Pulsed Drain Current	T_C=25°C	20	
P_D	Maximum Power Dissipation	T_C=25°C	36	W
		T_C=100°C	14	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		3.4	°C/W
I_D	Continuous Drain Current	T_A=25°C	3.1	A
		T_A=70°C	2.5	
P_D	Maximum Power Dissipation	T_A=25°C	2.5	W
		T_A=70°C	1.6	
$R_{\theta JA}$ [c]	Thermal Resistance-Junction to Ambient		50	°C/W
I_{AS} [b]	Avalanche Current, Single pulse (L=0.5mH)		6	A
E_{AS} [b]	Avalanche Energy, Single pulse (L=0.5mH)		9	mJ

Note a: Pulse width limited by maximum junction temperature.

b: UIS tested and pulse width limited by maximum junction temperature 150ºC (initial temperature Tj=25ºC).

c: Surface Mounted on 1in^2 pad area.

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

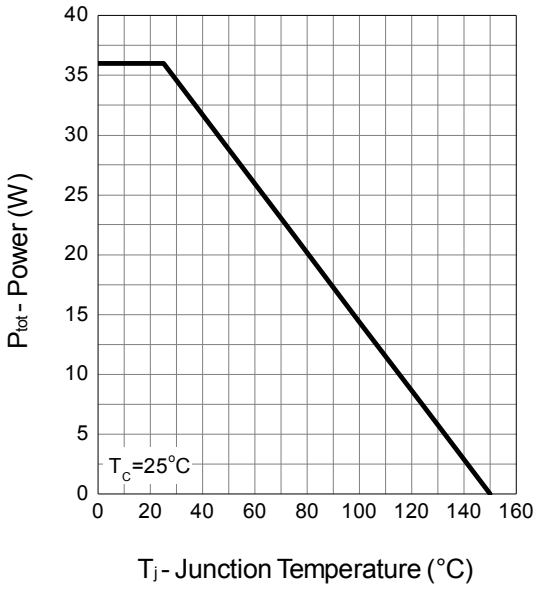
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=80V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1	2	3	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=6A	-	100	120	mΩ
		V_{GS}=4.5V, I_{DS}=5A	-	105	135	
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=6A, V_{GS}=0V	-	0.8	1.3	V
t_{rr}	Reverse Recovery Time	I_{SD}=6A, dI_{SD}/dt=100A/μs	-	27	-	ns
Q_{rr}	Reverse Recovery Charge		-	38	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	2.5	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, Frequency=1.0MHz	-	585	760	pF
C_{oss}	Output Capacitance		-	36	-	
C_{rss}	Reverse Transfer Capacitance		-	20	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=30V, R_L=30Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	10	18	ns
t_r	Turn-on Rise Time		-	7	13	
$t_{d(OFF)}$	Turn-off Delay Time		-	22	40	
t_f	Turn-off Fall Time		-	4	7	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=30V, V_{GS}=4.5V, I_{DS}=6A	-	6.1	-	nC
Q_g	Total Gate Charge	V_{DS}=30V, V_{GS}=10V, I_{DS}=6A	-	13	19	
Q_{gs}	Gate-Source Charge		-	2.4	-	
Q_{gd}	Gate-Drain Charge		-	2.4	-	

Note d: Pulse test; pulse width≤300μs, duty cycle≤2%.

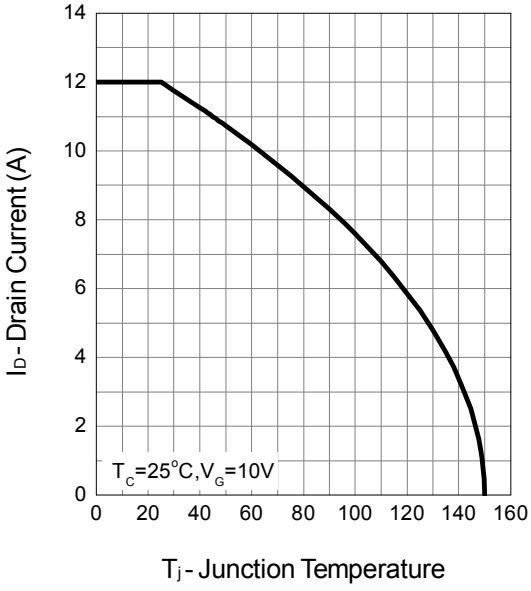
E: Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

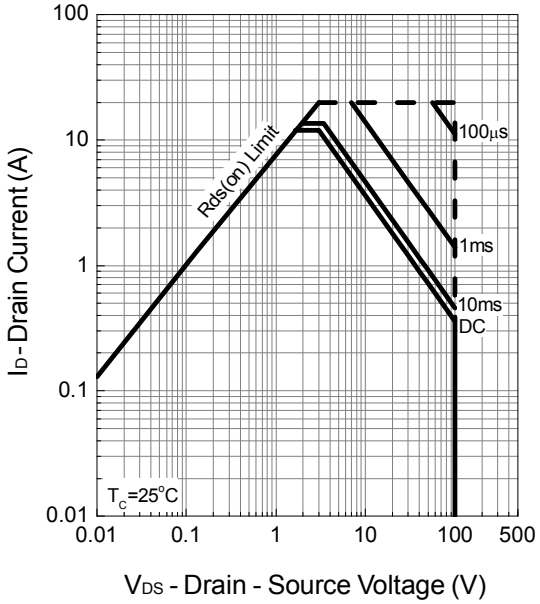
Power Dissipation



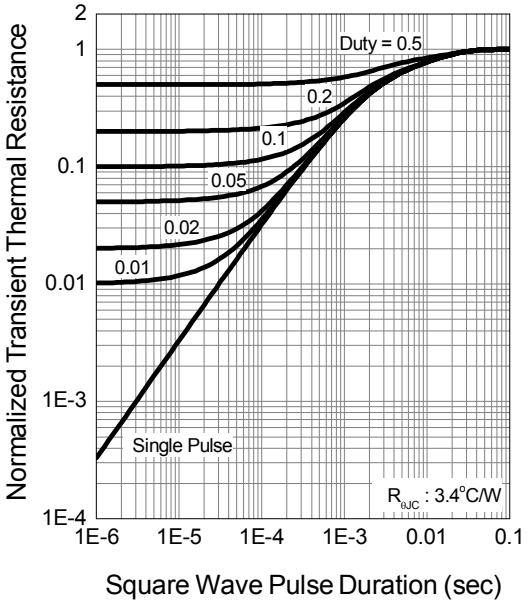
Drain Current



Safe Operation Area

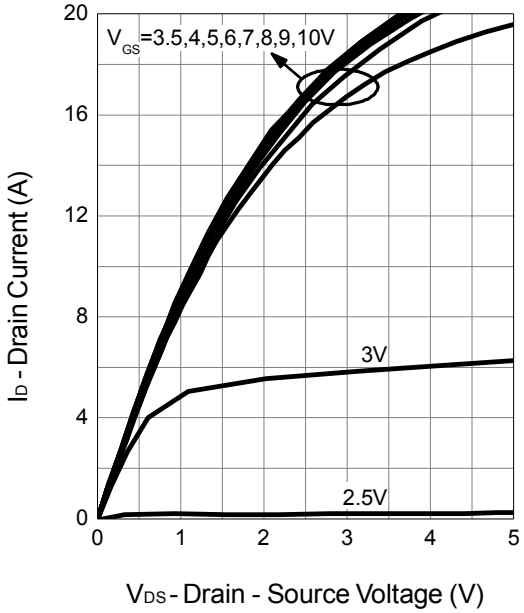


Thermal Transient Impedance

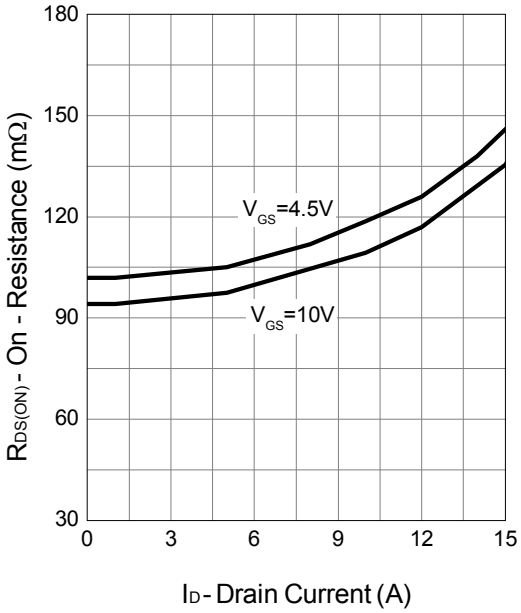


Typical Operating Characteristics (Cont.)

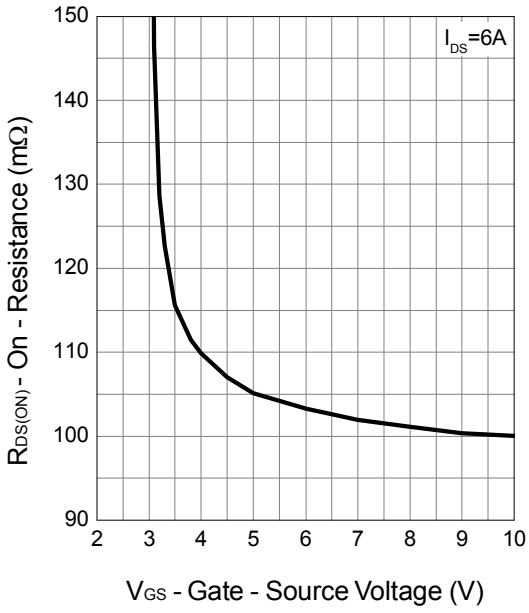
Output Characteristics



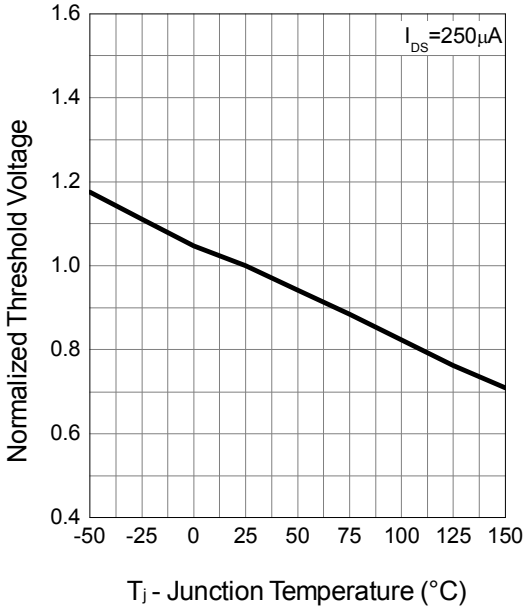
Drain-Source On Resistance



Gate-Source On Resistance

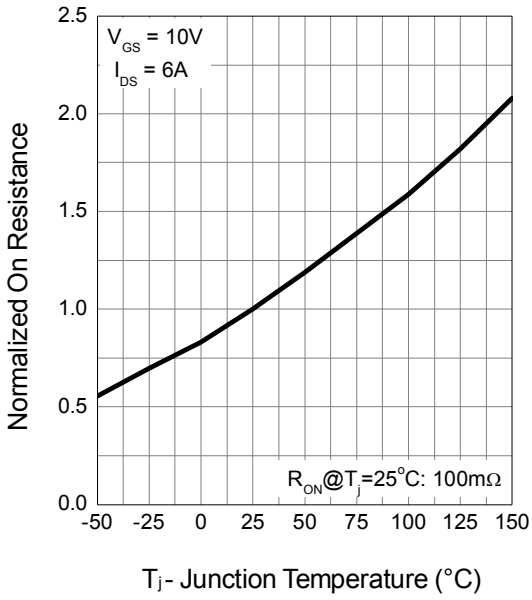


Gate Threshold Voltage



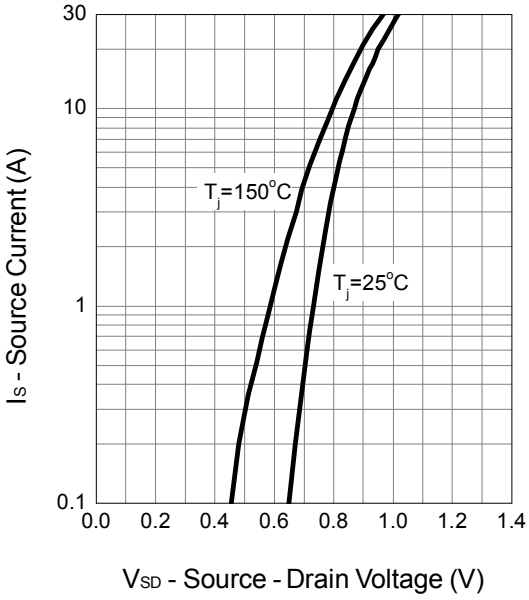
Typical Operating Characteristics (Cont.)

Drain-Source On Resistance



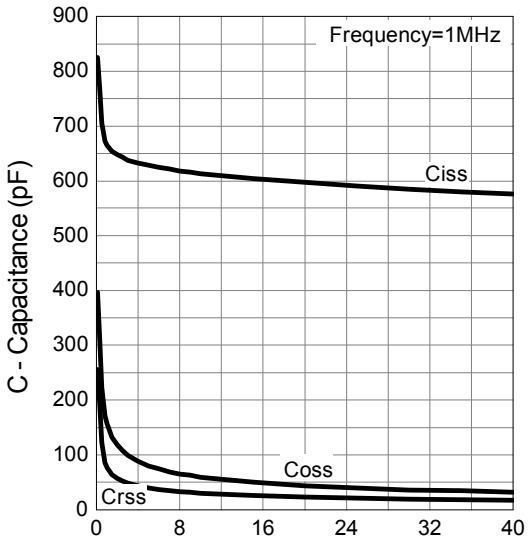
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



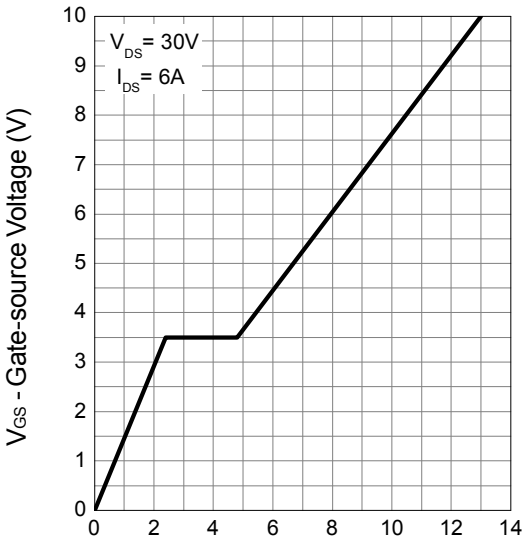
V_{SD} - Source - Drain Voltage (V)

Capacitance



V_{DS} - Drain-Source Voltage (V)

Gate Charge



Q_G - Gate Charge (nC)