SemTron Microtech Corporation

SMC4870NA

Single N-Channel MOSFET

■DESCRIPTION

SMC4870 is the N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior ,fast switching performance, and withstand high energy pulse in the avalanche and commutation mode.

■FEATURES

V_{DS} = 30V, I_D = 35A

$R_{DS(ON)}$=9mΩ(Typ.)@V_{GS}=10V
$R_{DS(ON}$ =12mΩ(Typ.)@V_{GS}=4.5V

◆100% Rg tested

■APPLICATIONS

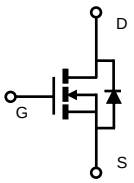
◆Power Management
◆DC/DC Converters
◆Battery Powered Systems

■PART NUMBER INFORMATION

SMC 4870 NA - TR G
a b c d e

a : Company name.
b : Product Serial number.
c : Package code NA:DFN3.3X3.3A-8
d : Handling code TR:Tape&Reel
e : Green produce code G:*RoHS Compliant*

DFN3.3X3.3A-8



■ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless otherwise noted)

Symbol	Parameter		Rating	Units
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C=25°C	35	A
		T_C=100°C	22	A
I_{DM}	Pulsed Drain Current [A]		88	A
I_D	Continuous Drain Current	T_A=25°C	15	A
		T_A=70°C	12	A
P_D	Power Dissipation [B]	T_A=25°C	3.6	W
		T_A=70°C	2.3	W
I_{AS}	Avalanche Current [A]		16	A
E_{AS}	Single Pulse Avalanche energy L=0.3mH [AF]		38	mJ
P_D	Power Dissipation [C]	T_C=25°C	20.8	W
		T_C=100°C	8.3	W
T_J	Operation Junction Temperature		-55/150	°C
T_{STG}	Storage Temperature Range		-55/150	°C

■THERMAL RESISTANCE

Symbol	Parameter		Typ	Max	Units
$R_{\theta JA}$	Thermal Resistance Junction to Ambient [B]	t≦10s		35	°C/W
	Thermal Resistance Junction to Ambient [BD]	Steady-State		65	
$R_{\theta JC}$	Thermal Resistance Junction to Case			6	

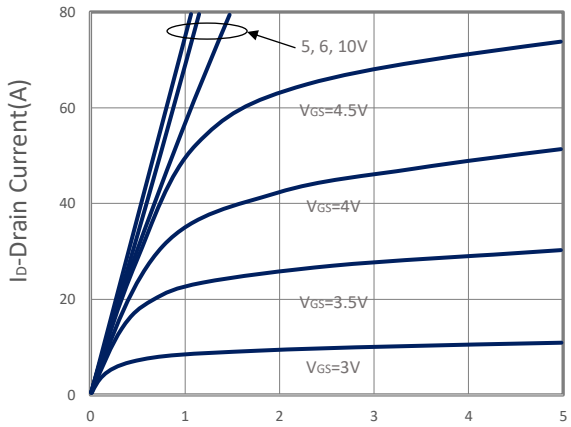
■ELECTRICAL CHARACTERISTICS(T_A = 25°C Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1	1.6	2.5	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V, T_J=25°C			1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=75°C			10	
$R_{DS(ON)}$	Drain-source On-Resistance [E]	V_{GS}=10V, I_D=15A V_{GS}=4.5V, I_D=10A		9 12	11 16	mΩ
G_{fs}	Forward Transconductance	V_{DS}=5V, I_D=-10A		45		S
Diode Characteristics						
V_{SD}	Diode Forward Voltage [E]	I_S=1A,V_{GS}=0V		0.7	1	V
I_S	Continuous Source Current				35	A
t_{rr}	Reverse Recovery Time	I_S=10A, dI/dt=100A/μs		16.8		ns
Q_{rr}	Reverse Recovery Charge			9.5		nC
Dynamic and Switching Parameters						
Q_g	Total Gate Charge (10V)	V_{DS}=15V,V_{GS}=10V, I_D=5A		14.8	20.7	nC
Q_g	Total Gate Charge (4.5V)			7.2	10.1	
Q_{gs}	Gate-Source Charge			2.6	3.6	
Q_{gd}	Gate-Drain Charge			2.8	3.9	
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1MHz		650		pF
C_{oss}	Output Capacitance			89		
C_{rss}	Reverse Transfer Capacitance			63		
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz		2.7		Ω
$t_{d(on)}$	Turn-On Time [E]	V_{DD}=15V, V_{GS}=10V, R_G=6Ω, I_D=1A		8	15	nS
t_r				10	19	
$t_{d(off)}$	Turn-Off Time [E]			22	42	
t_f				6.6	13	

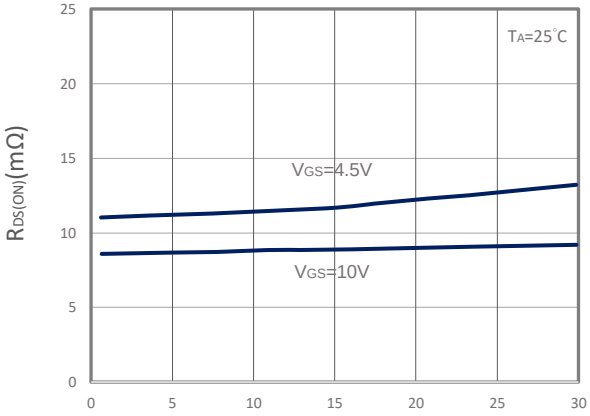
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

A. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}$=150°C.
B. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board in a still air environment with maximum junction temperature $T_{J(MAX)}$=150°C (initial temperature T_A=25°C).
C. $T_{J(MAX)}$=150°C,using junction-to-ambient thermal resistance, t ≦10sec.
D. $T_{J(MAX)}$=150°C,using junction-to-case thermal resistance ($R_{\theta JC}$) is more useful in additional heat sinking is used.
E. The data tested by pulsed , pulse width ≦ 300μS , duty cycle ≦ 2%.
F. The E_{AS} data shows Max, tested and pulse width limited by $T_{J(MAX)}$=150°C (initial temperature T_J=25°C).

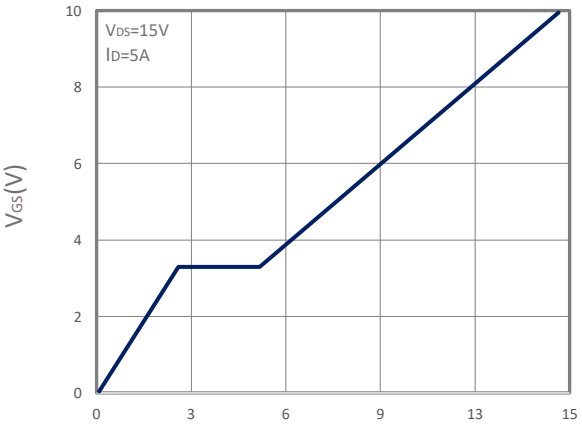
TYPICAL CHARACTERISTICS



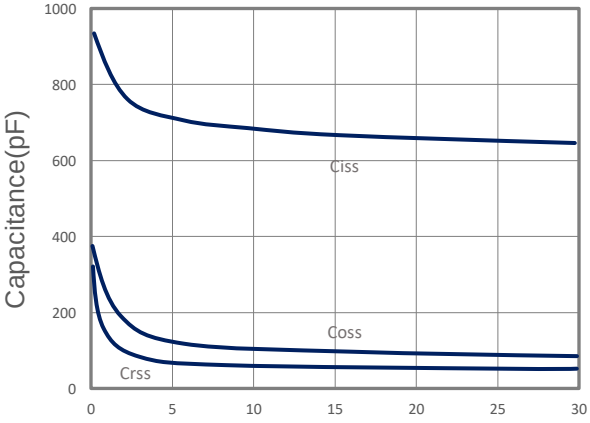
Output Characteristics



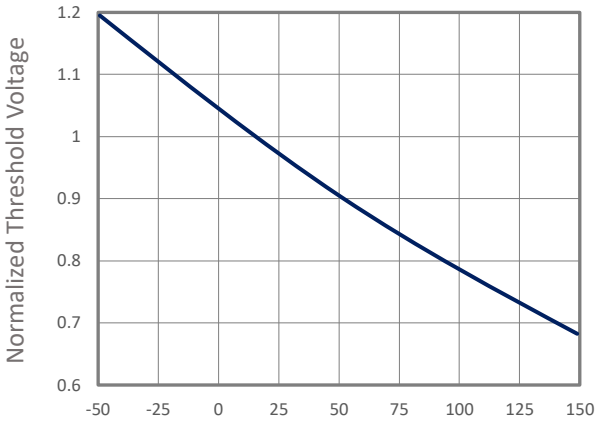
Drain-Source On Resistance



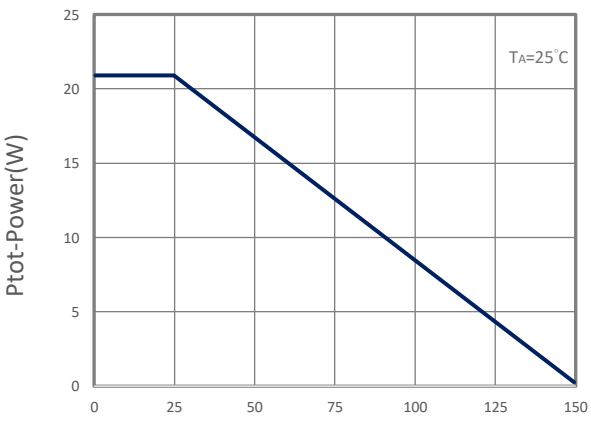
Gate Charge



Capacitance

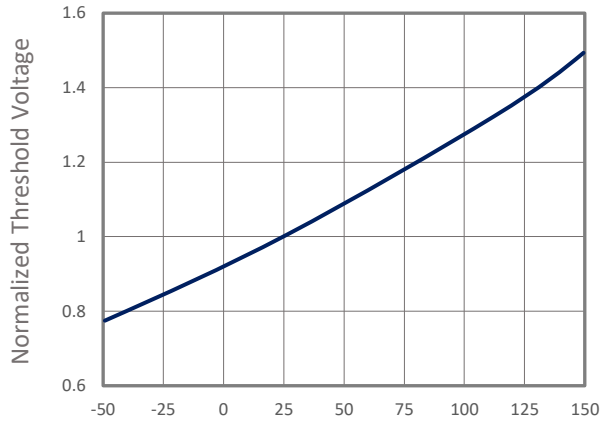


Gate Threshold Voltage

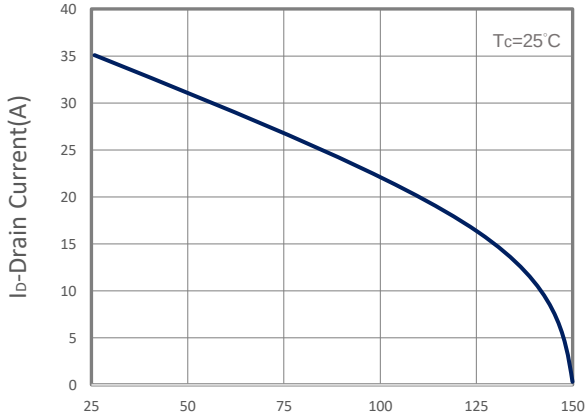


Power Dissipation

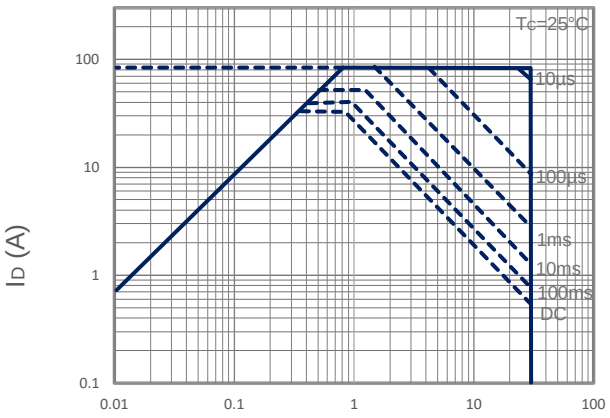
TYPICAL CHARACTERISTICS



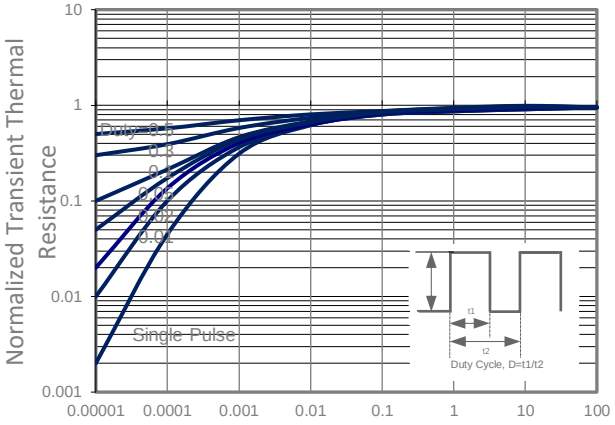
Gate Threshold Voltage



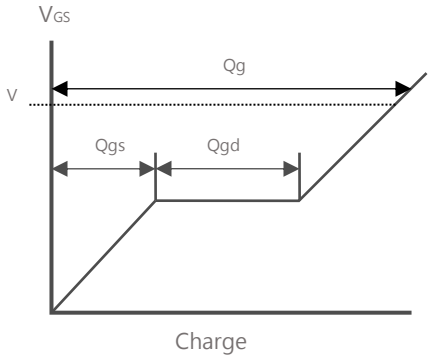
Drain Current vs Tc



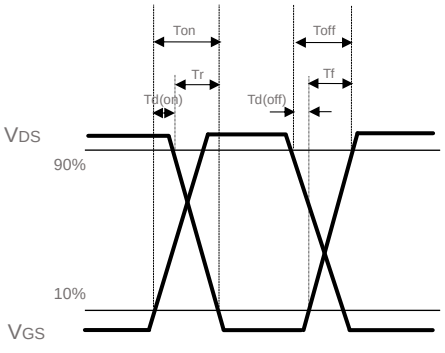
Maximum Safe Operation Area



Thermal Transient Impedance

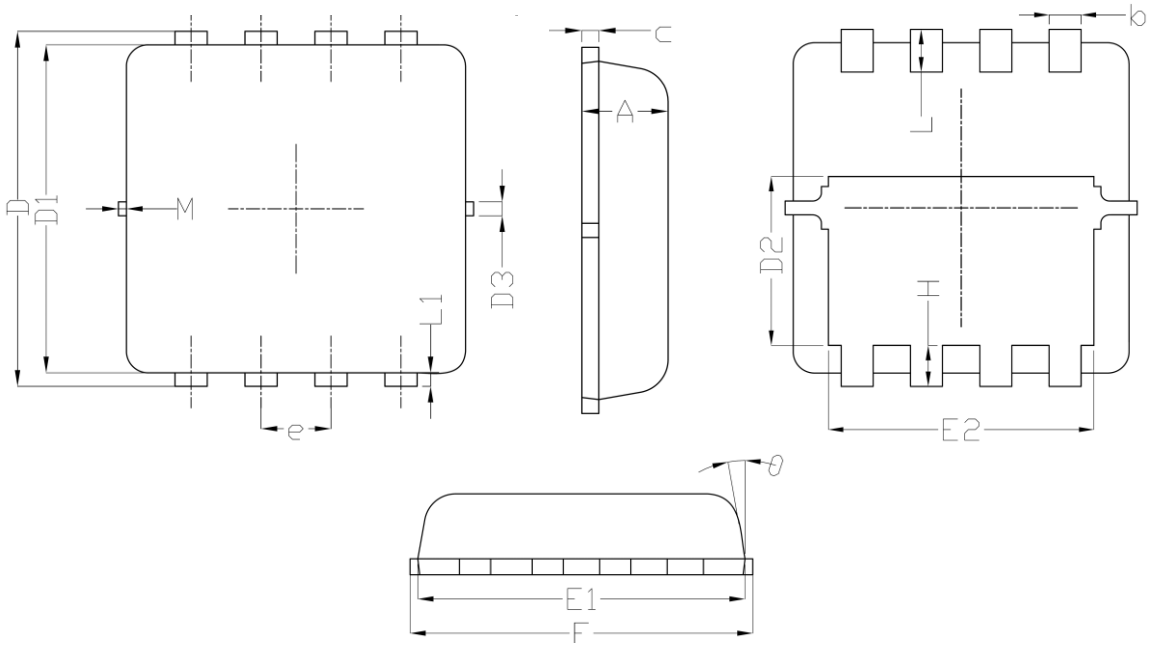


Gate Chrge Waveform



Switching Time Waveform

■DFN3.3X3.3A-8 PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.014
c	0.100	0.250	0.004	0.010
D	3.300	3.400	0.130	0.134
D1	3.250	3.450	0.128	0.136
D2	1.780	1.980	0.070	0.078
D3	-	0.130	-	0.005
E	3.200	3.400	0.126	0.134
E1	3.000	3.200	0.118	0.126
E2	2.390	2.590	0.094	0.102
e	0.65BSC.		0.026BSC.	
H	0.300	0.500	0.012	0.020
L	0.300	0.500	0.012	0.020
L1	-	0.130	-	0.005
M	-	0.150	-	0.006
Θ	0°	12°	0°	15°

Recommended Land Pattern