

Single N-Channel MOSFET

DESCRIPTION

SMC4452NA is the N-Channel enhancement mode power field effect transistors, provide superior fast switching performance and withstand high energy pulse in the avalanche and commutation mode.

PART NUMBER INFORMATION

SMC 4452 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

FEATURES

$V_{DS}=40V, I_D=50A$

$R_{DS(ON)}=4.2m\Omega(Typ.)@V_{GS}=10V$

$R_{DS(ON)}=5.3m\Omega(Typ.)@V_{GS}=4.5V$

- ◆ 100% EAS Guaranteed
- ◆ Fast Switching Characteristic
- ◆ Repetitive Avalanche Rated



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ Unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	40	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Pulsed Drain Current [*]	$T_C=25^\circ C$	50
		$T_C=100^\circ C$	42.2
I_{DM}	Pulsed Drain Current ^B	150	A
I_D	Continuous Drain Current	$T_A=25^\circ C$	19.5
		$T_A=70^\circ C$	15.6
P_D	Power Dissipation ^A	$T_A=25^\circ C$	3.1
		$T_A=70^\circ C$	2
I_{AS}	Single Pulse Avalanche Current ^B	30	A
EAS	Single Pulse Avalanche energy $L=0.1mH$ ^B	45	mJ
P_D	Power Dissipation ^C	$T_C=25^\circ C$	36.8
		$T_C=100^\circ C$	14.7
T_J	Operation Junction Temperature	-55/150	$^\circ C$
T_{STG}	Storage Temperature Range	-55/150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Typ	Max	Units
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ^A	$t \leq 10s$	40	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	65	
$R_{\theta JC}$	Thermal Resistance Junction to Case		3.4	

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

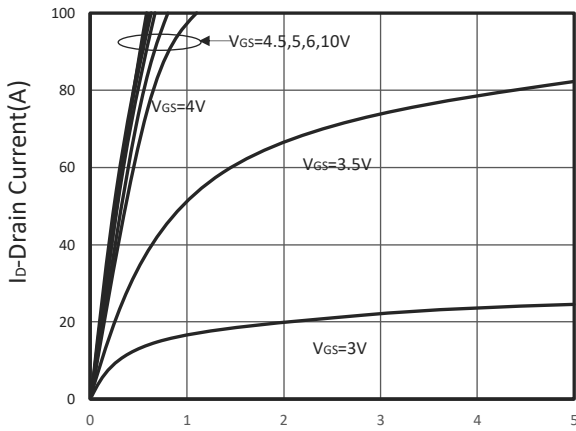
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	40			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250 μ A	1	1.6	2.5	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} = \pm 20V			\pm 100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V, T _J =25 $^\circ$ C			1	μ A
		V _{DS} =32V, V _{GS} =0V, T _J =75 $^\circ$ C			10	
R _{DS(ON)}	Drain-source On-Resistance ^D	V _{GS} =10V, I _D =20A V _{GS} =4.5V, I _D =12A		4.2 5.3	5 7	m Ω
G _{fs}	Forward Transconductance	V _{DS} =5V, I _D =10A		22		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage ^D	I _S =1A, V _{GS} =0V			1	V
I _S	Diode Continuous Forward Current				25	A
t _{rr}	Reverse Recovery Time	I _S =20A, di/dt=100A/ μ s		20		ns
Q _{rr}	Reverse Recovery Charge			14		nC
Dynamic and Switching Parameters^E						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _D =20A		33		nC
Q _g	Total Gate Charge (4.5V)			15.3		
Q _{gs}	Gate-Source Charge			3.8		
Q _{gd}	Gate-Drain Charge			8		
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz		1820		pF
C _{oss}	Output Capacitance			245		
C _{rss}	Reverse Transfer Capacitance			169		
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		1.6		Ω
t _{d(on)}	Turn-On Time	V _{DD} =20V, V _{GS} =10V, R _G =6 Ω , I _D =1A		15.5	29	nS
t _r				9.7	18	
t _{d(off)}	Turn-Off Time			34	65	
t _f				13.8	26	

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

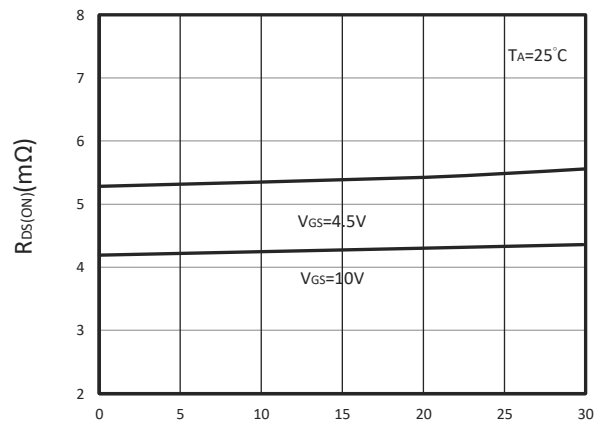
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^\circ$ C (initial temperature T_J=25 $^\circ$ C).
- C. Using \leq 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150 $^\circ$ C.
- D. Pulse test width \leq 300 μ s and duty cycle \leq 2%.
- E. Guaranteed by design, not subject to production testing.
- *. The maximum rating current is limited by the package.

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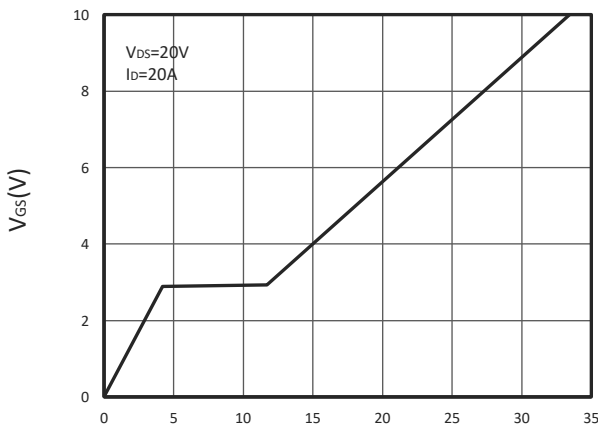
TYPICAL CHARACTERISTICS



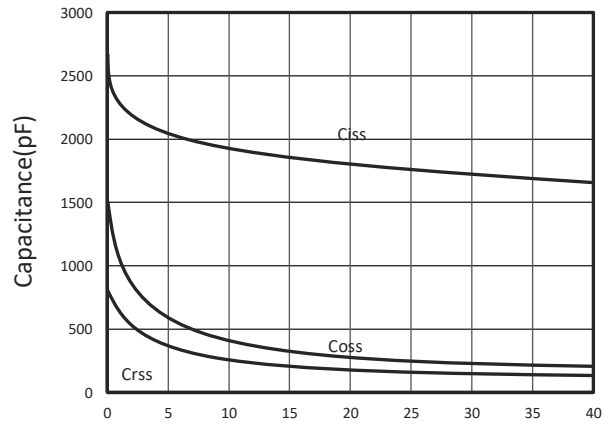
Output Characteristics



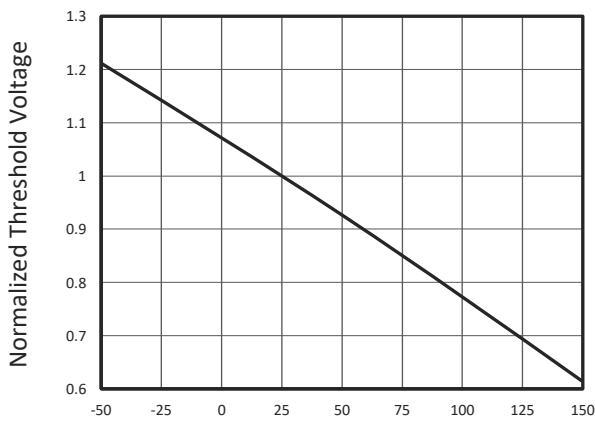
Drain-Source On Resistance



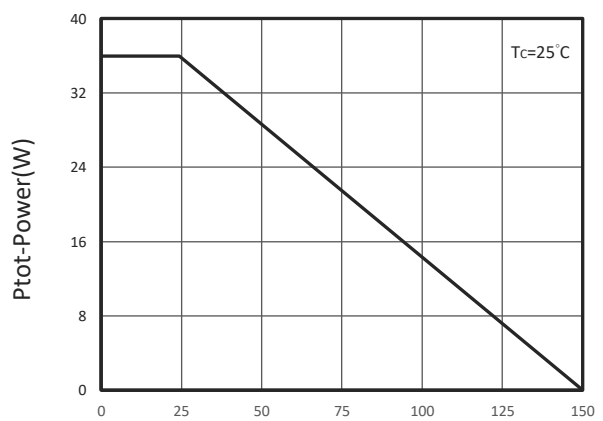
Gate Charge



Capacitance

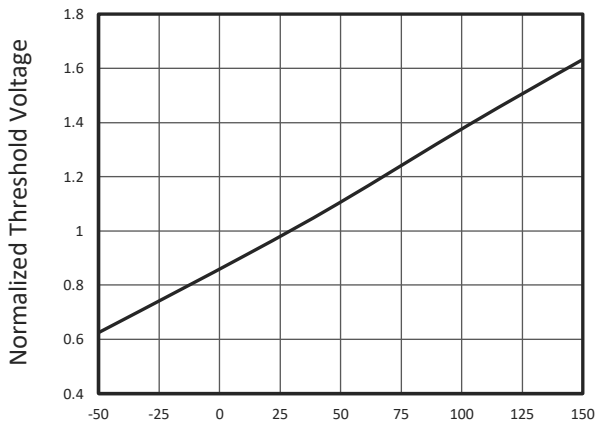


Gate Threshold Voltage

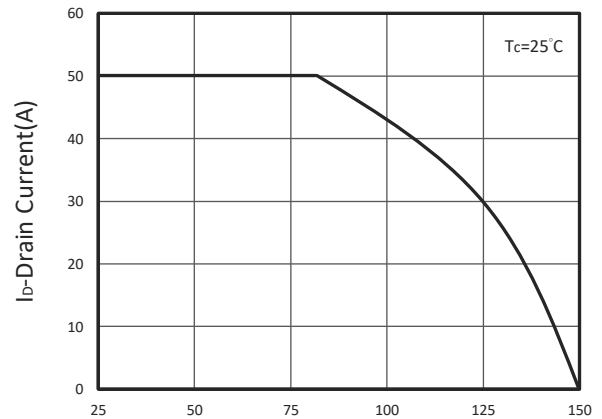


Power Dissipation

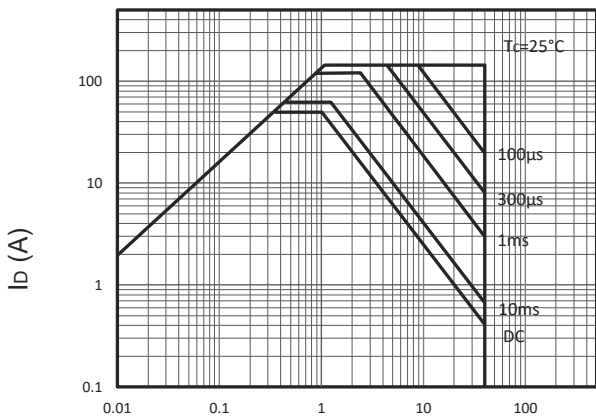
TYPICAL CHARACTERISTICS



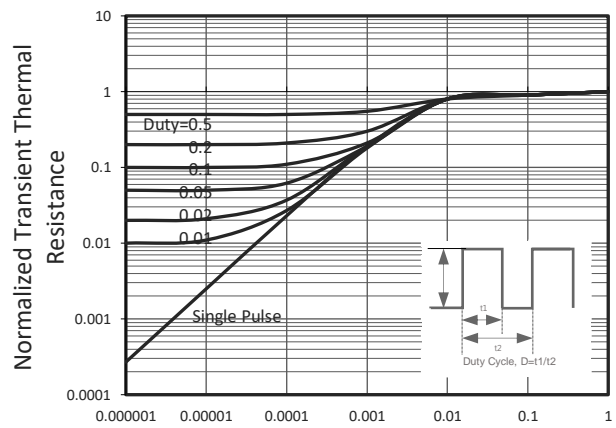
T_j-Junction Temperature(°C)
Gate Threshold Voltage



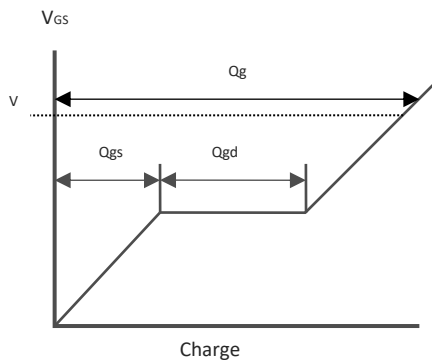
T_c-Case Temperature(°C)
Drain Current vs T_c



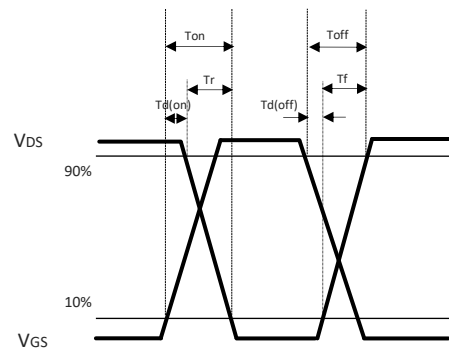
V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

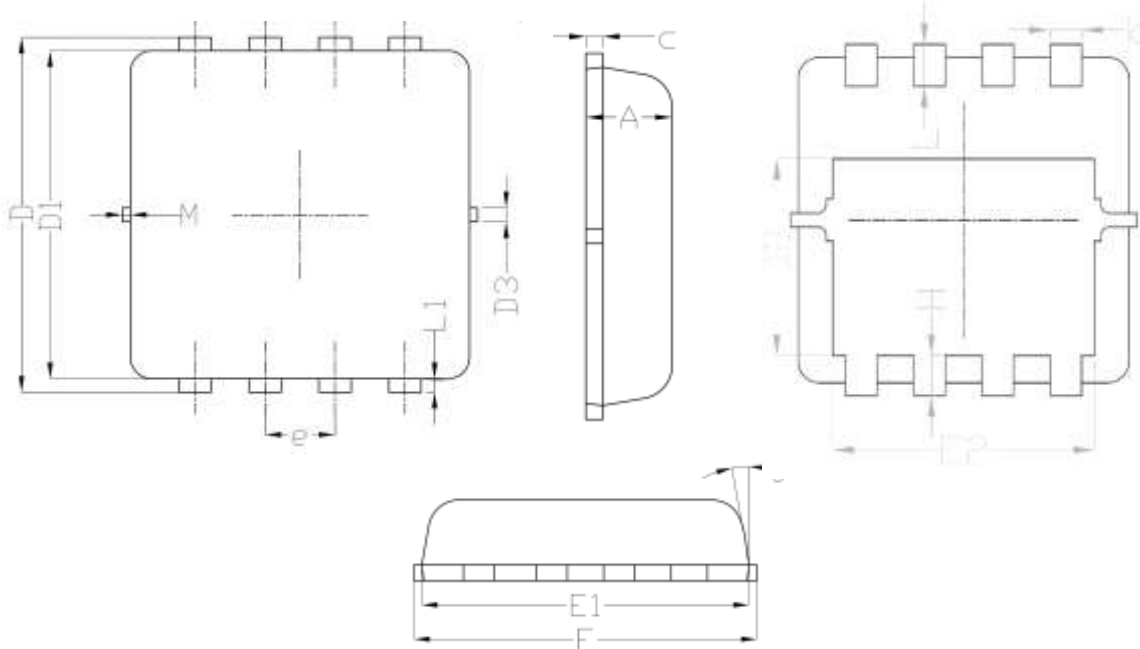


Gate Charge Waveform



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	3.250	3.450	0.128	0.136
D1	3.000	3.200	0.118	0.126
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°	12°

Recommended Land Pattern

