

Single N-Channel MOSFET

DESCRIPTION

SMC4738PA 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. These devices are well suited for high efficiency fast switching applications.

PART NUMBER INFORMATION

SMC 4738 PA - TR G
 a b c d e

a : Company name.
 b : Product Serial number.
 c : Package code PA:DFN5X6A-8
 d : Handling code TR:Tape&Reel
 e : Green produce code G:RoHS Compliant

FEATURES

$V_{DS}=30V$, $I_D=50A$

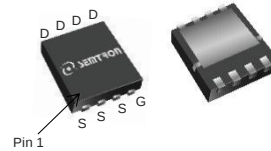
$R_{DS(ON)}=7m\Omega(Typ.)@V_{GS}=10V$

$R_{DS(ON)}=9.5m\Omega(Typ.)@V_{GS}=4.5V$

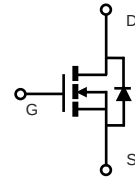
- ◆ 100% EAS Guaranteed
- ◆ Low Gate Charge
- ◆ Fast Switching
- ◆ Improved dv/dt Capability

APPLICATIONS

- ◆ Power Management
- ◆ Load Switch



DFN5X6A-8



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C=25^{\circ}C$	50
		$T_C=100^{\circ}C$	30.7
I_{DM}	Pulsed Drain Current ^B	150	A
I_D	Continuous Drain Current	$T_A=25^{\circ}C$	20
		$T_A=70^{\circ}C$	16
P_D	Power Dissipation ^A	$T_A=25^{\circ}C$	5
		$T_A=70^{\circ}C$	3.2
I_{AS}	Avalanche Current ^A	30	A
EAS	Single Pulse Avalanche energy $L=0.1mH$ ^B	45	mJ
P_D	Power Dissipation ^C	$T_C=25^{\circ}C$	32.9
		$T_C=100^{\circ}C$	13.2
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	$t \leq 10s$	25	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	55	
$R_{\theta JC}$	Thermal Resistance Junction to Case		3.8	

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

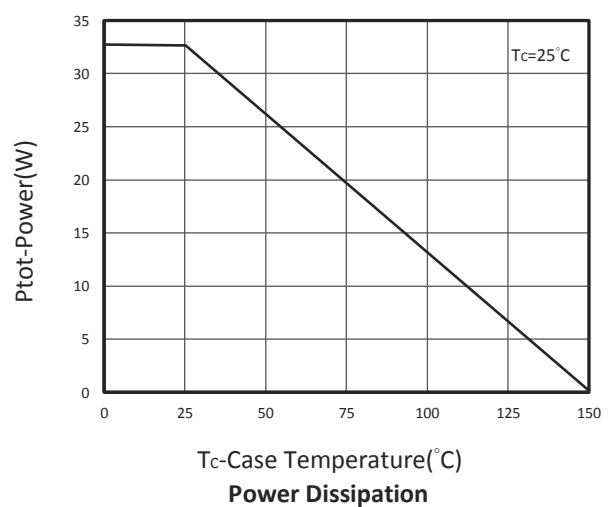
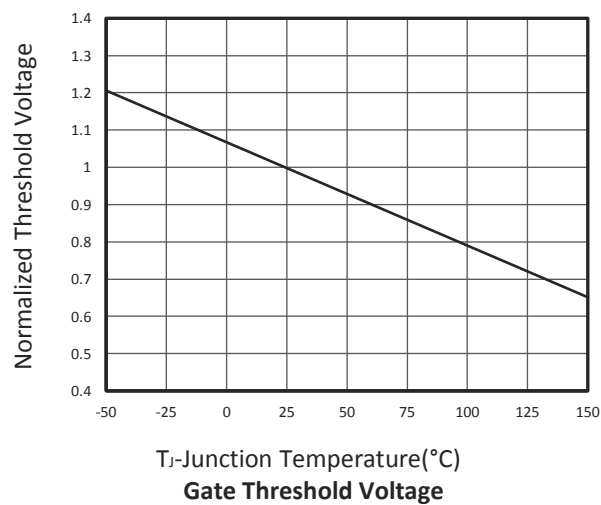
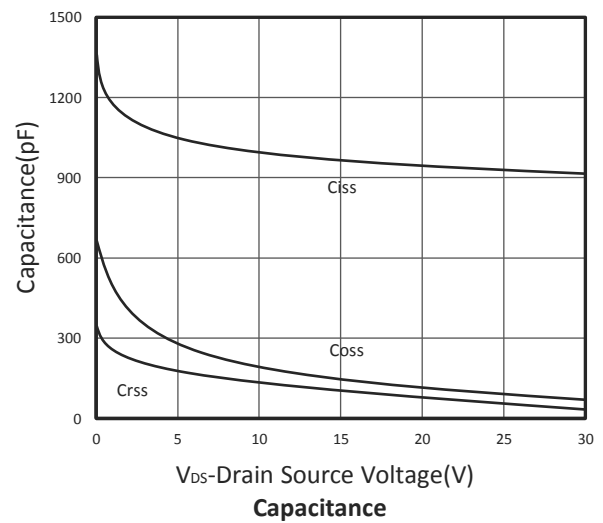
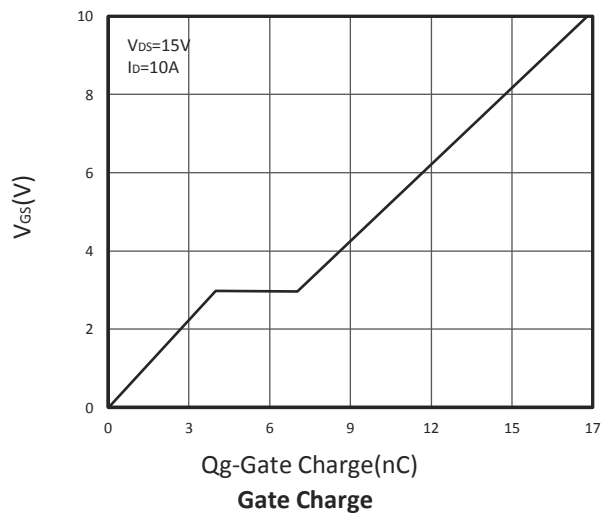
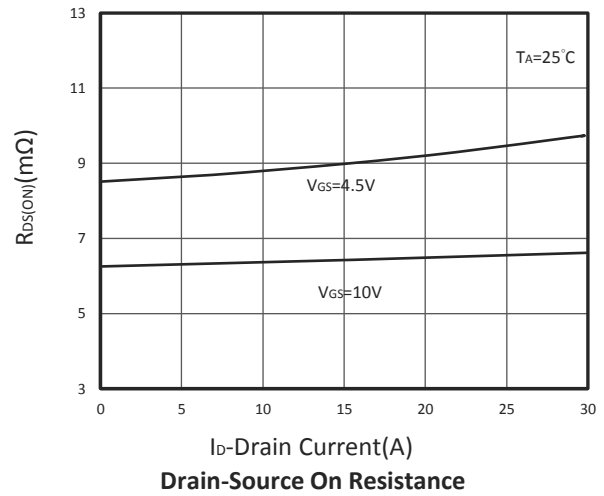
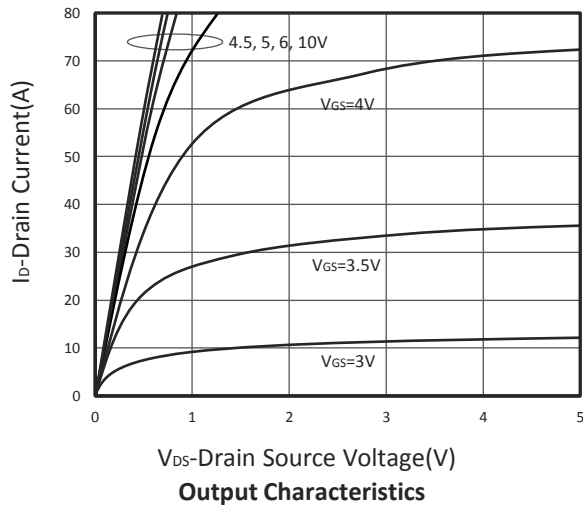
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.2	1.5	2.5	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±20V			±100	nA
I _{DSS}	Zero 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 °	V _{GS} =10V, I _D =20A V _{GS} =4.5V, I _D =15A		6.5 9	8 12	mΩ
G _{fs}	Forward Transconductance	V _{DS} =5V, I _D =10A		14		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage °	I _S =1A, V _{GS} =0V			1	V
I _S	Diode Continuous Forward Current				50	A
T _{rr}	Reverse Recovery Time	I _S =10A, dI/dt=100A/μs		9		ns
Q _{rr}	Reverse Recovery Charge			3.2		nC
Dynamic and Switching Parameters [Ⓔ]						
Q _g	Total Gate Charge (10V)	V _{DS} =15V, V _{GS} =10V, I _D =10A		16.9		nC
Q _g	Total Gate Charge (4.5V)			7.9		
Q _{gs}	Gate-Source Charge			3.7		
Q _{gd}	Gate-Drain Charge			3.2		
C _{iss}	Input Capacitance	V _{DS} =15V,V _{GS} =0V, f=1MHz		955		pF
C _{oss}	Output Capacitance			138		
C _{rss}	Reverse Transfer Capacitance			110		
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		2.5		Ω
t _{d(on)}	Turn-On Time	V _{DD} =15V, V _{GEN} =10V, R _G =3.3Ω, I _D =1A		5	8.7	nS
t _r				9.6	18	
t _{d(off)}	Turn-Off Time			28	53	
t _f				8	15	

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

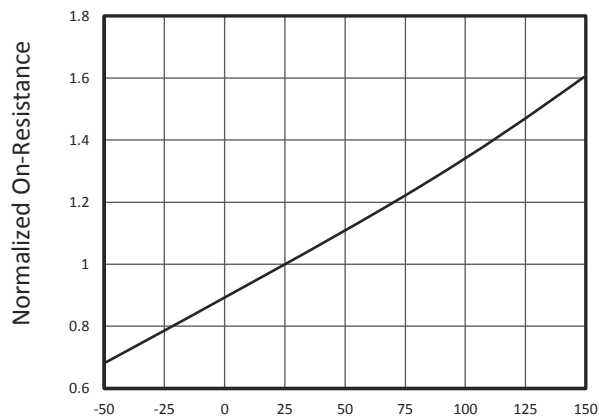
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150°C (initial temperature T_J=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150°C.
- D. Pulse test width ≤300μs and duty cycle ≤ 2%.
-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

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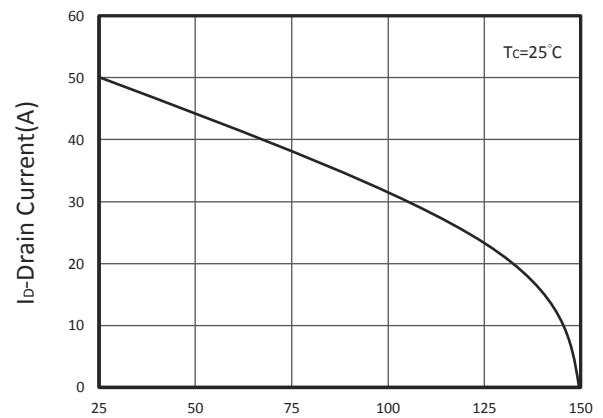
TYPICAL CHARACTERISTICS



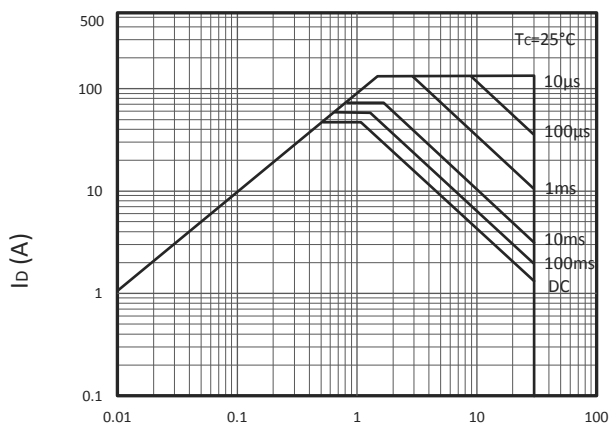
TYPICAL CHARACTERISTICS



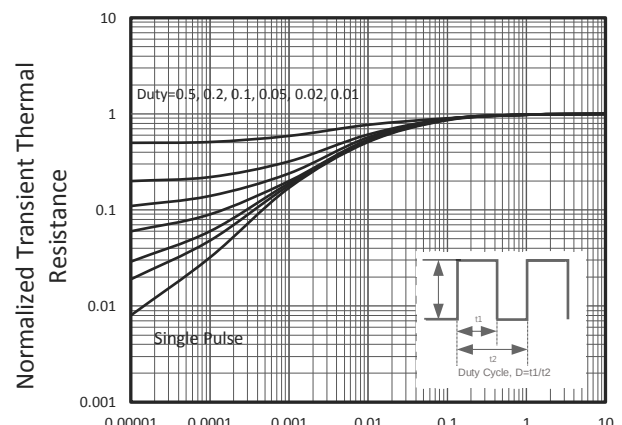
Drain-Source On Resistance



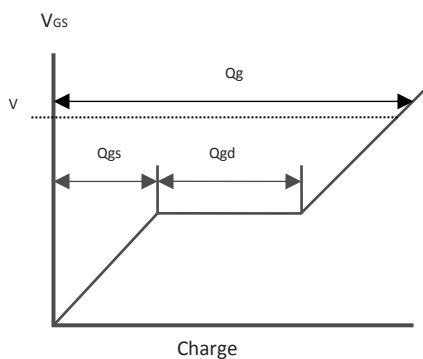
Drain Current vs Tc



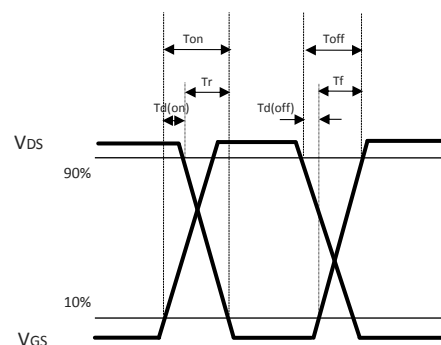
Maximum Safe Operation Area



Thermal Transient Impedance

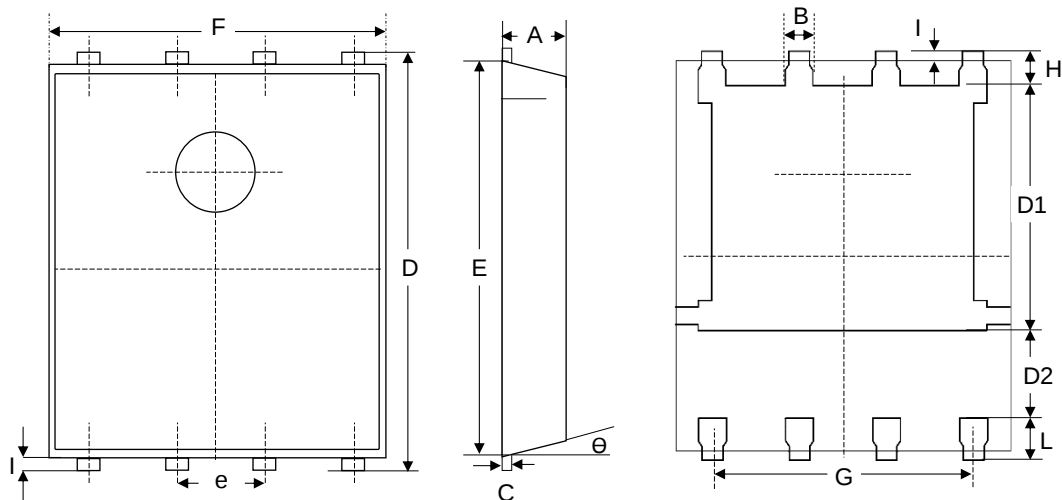


Gate Charge Waveform



Switching Time Waveform

DFN5X6A PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
B	0.330	0.510	0.013	0.020
C	0.200	0.300	0.008	0.012
D	5.900	6.100	0.232	0.240
D1	3.380	3.780	0.133	0.149
D2	1.100		0.043	
E	5.700	5.800	0.224	0.228
e	1.270BSC.		1.270BSC.	
F	4.800	5.000	0.189	0.197
G	0.361	0.396	0.014	0.016
H	0.410	0.610	0.016	0.024
I	0.060	0.200	0.002	0.008
L	0.510	0.710	0.020	0.028
θ	0°	12°	0°	12°

Recommended Land Pattern

