

Single N-Channel MOSFET

DESCRIPTION

SMC6216K is the N-Channel enhancement mode power field effect transistors, this advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. These devices are well suited for high efficiency fast switching applications.

PART NUMBER INFORMATION

SMC 6216 K - TR G
 a b c d e

- a : Company name.
- b : Product Serial number.
- c : Package code K: SOT-89
- d : Handling code TR: Tape&Reel
- e : Green produce code G: RoHS Compliant

FEATURES

$V_{DS}=60V$, $I_D=5.6A$

$R_{DS(ON)}=55m\Omega(Typ.)@V_{GS}=10V$

$R_{DS(ON)}=62m\Omega(Typ.)@V_{GS}=4.5V$

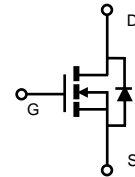
- ◆ Fast switching

APPLICATIONS

- ◆ Motor drive
- ◆ Power Management
- ◆ LED Lighting



SOT-89



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

Symbol	Parameter	Rating	Units	
V_{DSS}	Drain-Source Voltage	60	V	
V_{GSS}	Gate-Source Voltage	± 20	V	
I_D	Continuous Drain Current	$T_A=25^{\circ}C$	5.6	A
		$T_A=70^{\circ}C$	4.5	A
I_{DM}	Pulsed Drain Current ^B	22.4	A	
I_{AS}	Avalanche Current ^B	8	A	
E_{AS}	Single Pulse Avalanche energy $L=0.3mH$ ^B	9.6	mJ	
P_D	Power Dissipation ^A	$T_A=25^{\circ}C$	3.6	W
		$T_A=70^{\circ}C$	2.3	W
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	$t \leq 10s$	35	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	70	

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

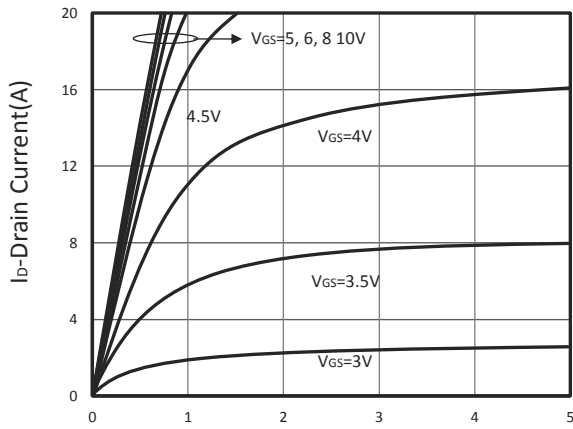
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	60			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.2	1.8	2.5	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±20V			±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V, T _J =25°C			1	μA
		V _{DS} =48V, V _{GS} =0V, T _J =75°C			10	
R _{DS(ON)}	Drain-source On-Resistance ^D	V _{GS} =10V, I _D =5.6A V _{GS} =4.5V, I _D =3.2A		55 62	64 76	mΩ
G _{fs}	Forward Transconductance	V _{DS} =10V, I _D =3.5A		6.8		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage ^D	I _S =1A, V _{GS} =0V			1	V
I _S	Diode Continuous Forward Current				3.1	A
t _{rr}	Reverse Recovery Time	I _S =1A, di/dt=100A/μs		22.8		ns
Q _{rr}	Reverse Recovery Charge	T _J =25°C		13.6		nC
Dynamic and Switching Parameters^E						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _D =3.5A		9.2	13.8	nC
Q _g	Total Gate Charge (4.5V)			4.5	6.8	
Q _{gs}	Gate-Source Charge			2.3	3.5	
Q _{gd}	Gate-Drain Charge			1.8	2.7	
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz		495		pF
C _{oss}	Output Capacitance			43		
C _{rss}	Reverse Transfer Capacitance			15		
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.95		Ω
t _{d(on)}	Turn-On Time	V _{DD} =30V, V _{GEN} =10V R _G =3.3Ω, I _D =1A		3.1	9	nS
t _r				9.2	18	
t _{d(off)}	Turn-Off Time			17.5	35	
t _f				5.5	10	

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

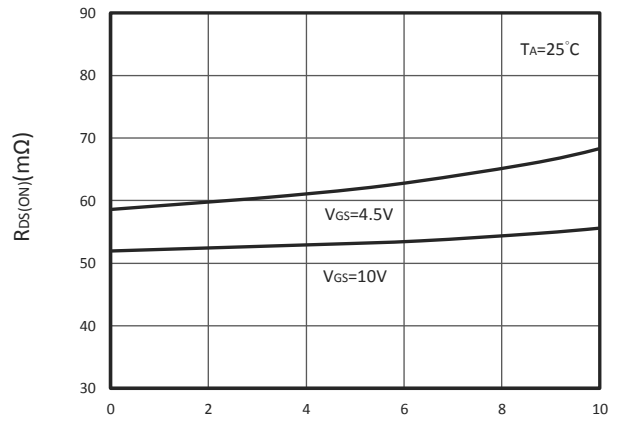
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150°C (initial temperature T_J=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150°C.
- D. Pulse test width ≤300μs and duty cycle ≤ 2%.
-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

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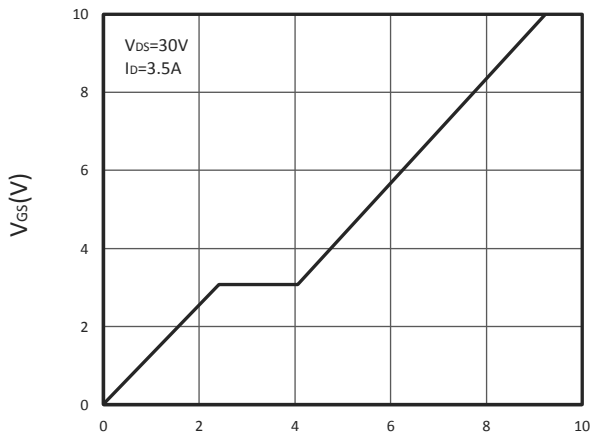
TYPICAL CHARACTERISTICS



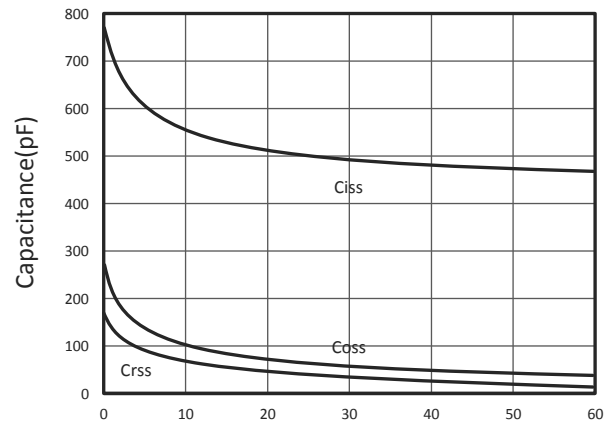
V_{DS}-Drain Source Voltage (V)
Output Characteristics



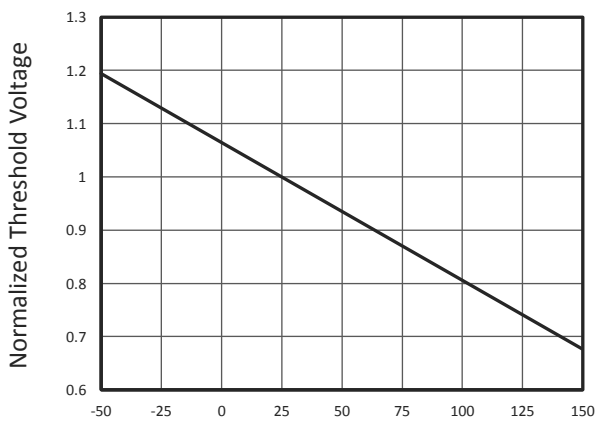
ID-Drain Current (A)
Drain-Source On Resistance



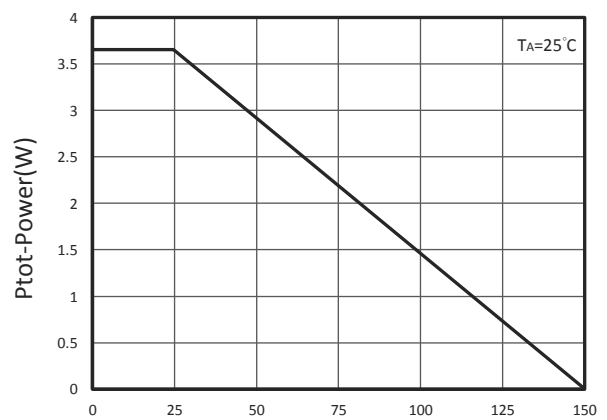
Q_G-Gate Charge (nC)
Gate Charge



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

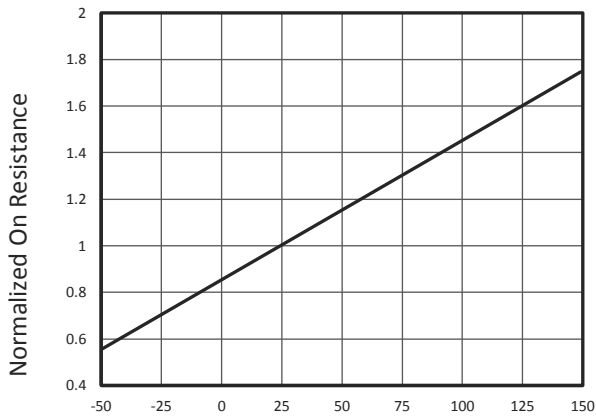


T_J-Junction Temperature (°C)
Gate Threshold Voltage

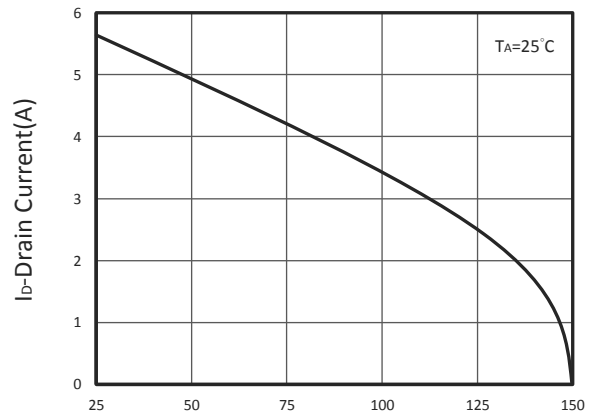


T_J-Junction Temperature (°C)
Power Dissipation

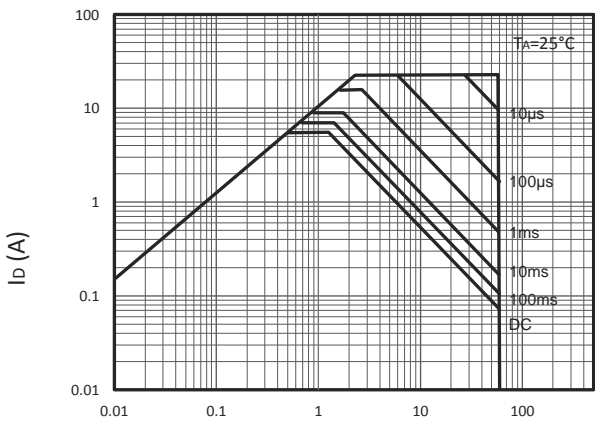
TYPICAL CHARACTERISTICS



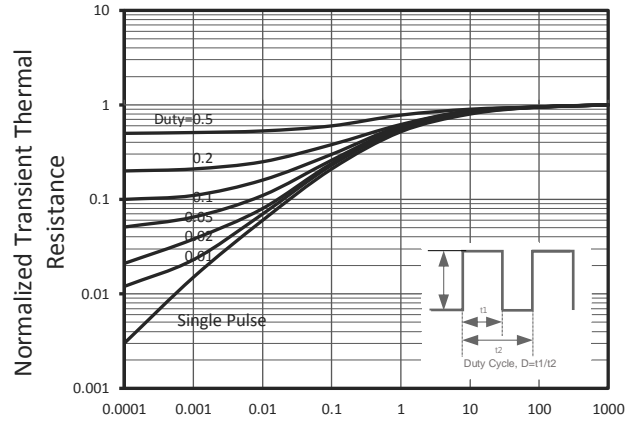
T_J-Junction Temperature(°C)
Drain-Source On Resistance



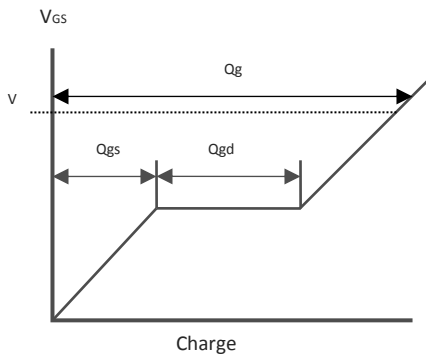
T_J-Junction Temperature(°C)
Drain Current vs T_J



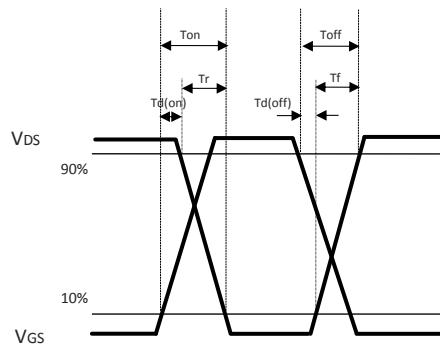
V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

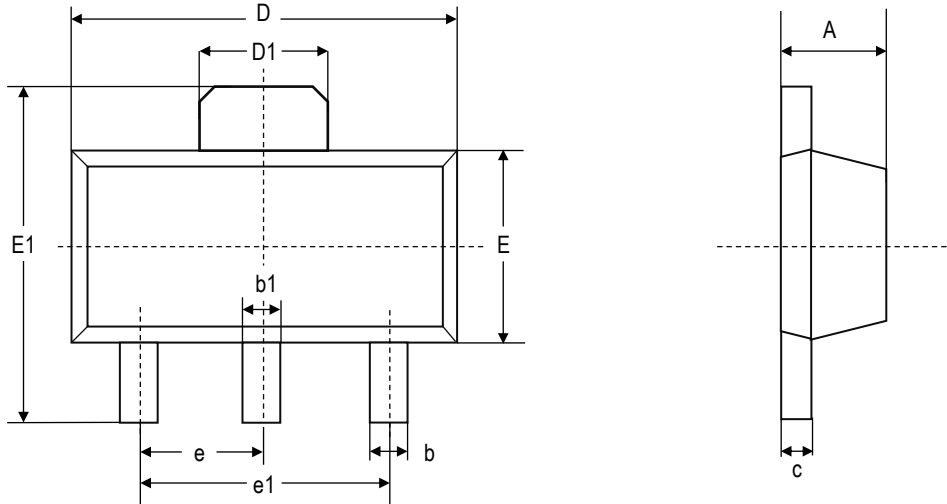


Gate Chrg Waveform



Switching Time Waveform

■ SOT-89 PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.440	1.540	0.567	0.606
b	0.350	0.450	0.138	0.177
b1	0.450	0.550	0.177	0.217
c	0.350	0.450	0.138	0.177
D	4.450	4.550	1.752	0.791
D1	1.650	1.750	0.650	0.689
E	2.450	2.550	0.965	1.004
E1	3.950	4.250	1.555	1.673
e	1.450	1.550	0.571	0.610
e1	2.900	3.100	1.142	1.220
L	0.900	1.200	0.354	0.472
θ	2°	10°	2°	10°