

Single P-Channel MOSFET

DESCRIPTION

SMC5225 is the P-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.

PART NUMBER INFORMATION

SMC 5225 H - TR G

a b c d e

- a : Company name.
- b : Product Serial number.
- c : Package code H:TO-252
- d : Handling code TR:Tape&Reel
- e : Green produce code G:RoHS Compliant

FEATURES

$V_{DS} = -30V, I_D = -22A$

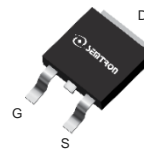
$R_{DS(ON)} = 38m\Omega(Typ.) @ V_{GS} = -10V$

$R_{DS(ON)} = 50m\Omega(Typ.) @ V_{GS} = -4.5V$

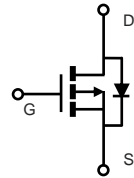
- ◆ High power and current handling capability

APPLICATIONS

- ◆ LED Application
- ◆ Power Management



TO-252



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ 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	$T_C = 25^\circ C$	-22
		$T_C = 100^\circ C$	-14
I_{DM}	Pulsed Drain Current ^A	-45	A
I_D	Continuous Drain Current	$T_A = 25^\circ C$	-9.2
		$T_A = 70^\circ C$	-7.3
P_D	Power Dissipation ^B	$T_A = 25^\circ C$	6.3
		$T_A = 70^\circ C$	4
I_{AS}	Avalanche Current ^A	-20	A
E_{AS}	Single Pulse Avalanche energy $L=0.3mH$ ^{AF}	60	mJ
P_D	Power Dissipation ^C	$T_C = 25^\circ C$	35
		$T_C = 100^\circ C$	14
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 ^B	$t \leq 10s$	20	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{BD}	Steady-State	50	
$R_{\theta JC}$	Thermal Resistance Junction to Case		3.5	

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

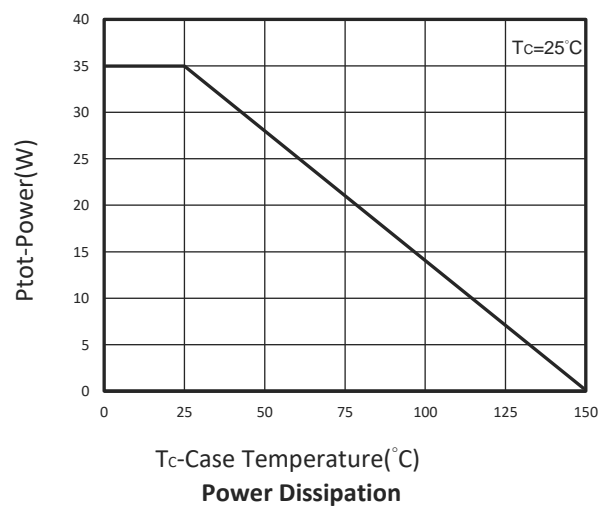
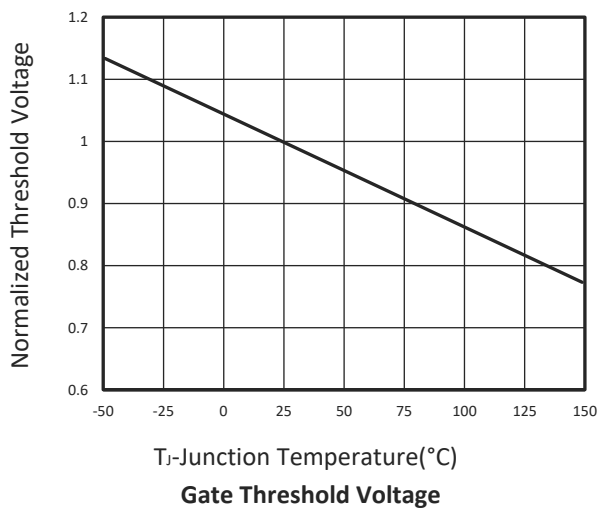
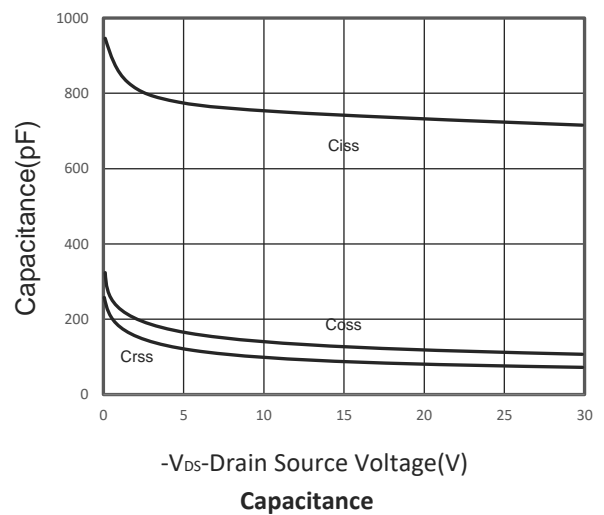
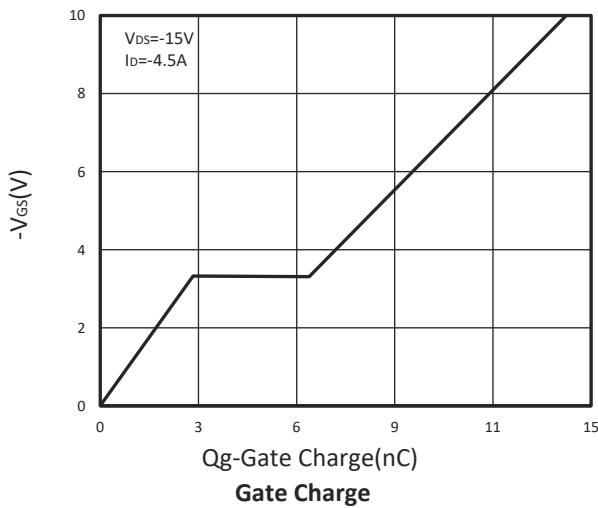
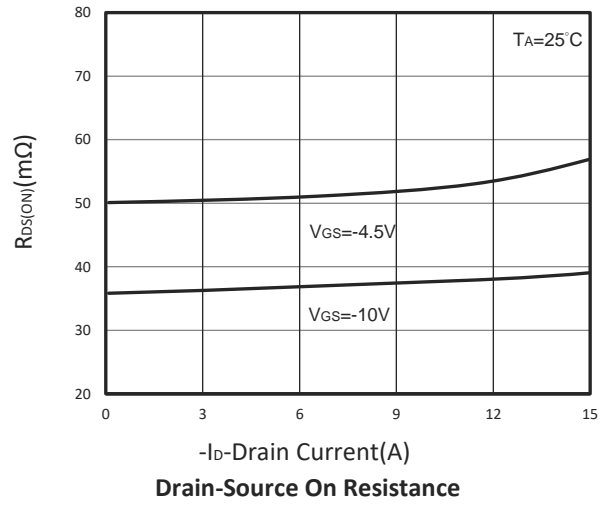
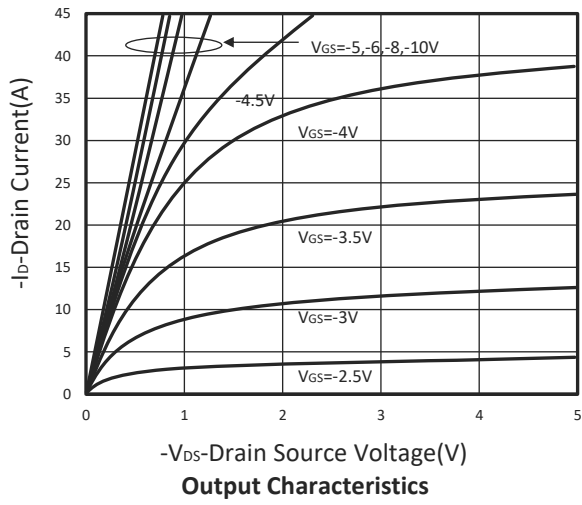
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250 μ A	-30			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250 μ A	-1	-1.5	-2	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} = \pm 20V			\pm 100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V, T _J =25 $^\circ$ C			-1	μ A
		V _{DS} =-24V, V _{GS} =0V, T _J =75 $^\circ$ C			-10	
R _{DS(ON)}	Drain-source On-Resistance	V _{GS} =-10V, I _D =-9.2A V _{GS} =-4.5V, I _D =-7A		38 50	45 65	m Ω
G _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-4.5A		6		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V			-1	V
I _S	Diode Continuous Forward Current				-9.2	A
t _{rr}	Reverse Recovery Time	I _S =-4.5A, dI/dt=100A/ μ s		8.1		ns
Q _{rr}	Reverse Recovery Charge				2.7	
Dynamic and Switching Parameters						
Q _g	Total Gate Charge	V _{DS} =-15V, V _{GS} =-10V I _D =-4.5A		13.9	19.5	nC
Q _g	Total Gate Charge (4.5V)			6.8	9.5	
Q _{gs}	Gate-Source Charge			2.9	4.1	
Q _{gd}	Gate-Drain Charge			3.5	4.9	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz		750		pF
C _{oss}	Output Capacitance			95		
C _{rss}	Reverse Transfer Capacitance			82		
t _{d(on)}	Turn-On Time	V _{DD} =-15V, V _{GEN} =-10V R _G =6 Ω , I _D =-1A		4	8	nS
t _r				10	19	
t _{d(off)}	Turn-Off Time			28.5	42	
t _f				7.6	14	

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

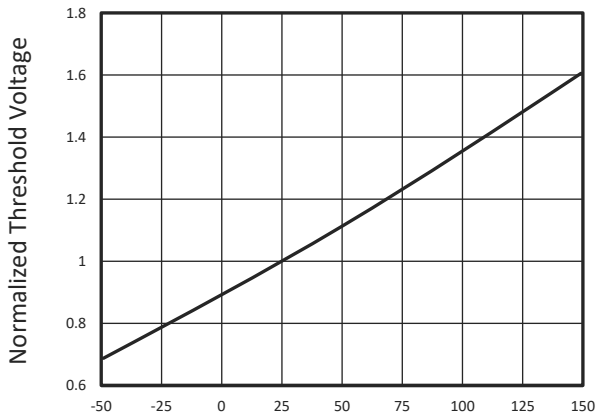
- Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^\circ$ C.
- Measure the value in a still air environment at T_A=25 $^\circ$ C, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature T_{J(MAX)}=150 $^\circ$ C.
- Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.
- T_{J(MAX)}=150 $^\circ$ C, using junction-to-case thermal resistance (R_{θJC}) is more useful in additional heat sinking is used.
- The pulse test width is \leq 300 μ s and the duty cycle \leq 2%.
- The EAS data shows Maximum, tested and pulse width limited by maximum.

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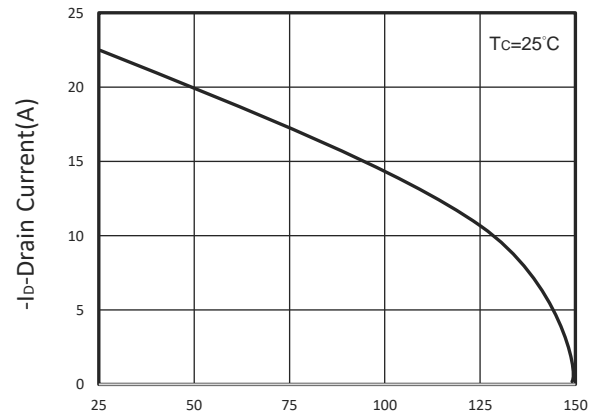
TYPICAL CHARACTERISTICS



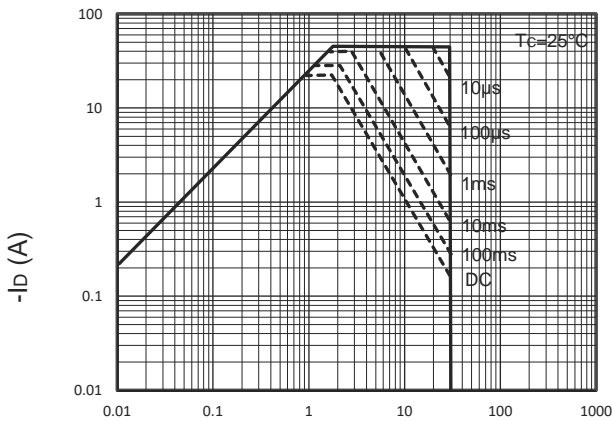
TYPICAL CHARACTERISTICS



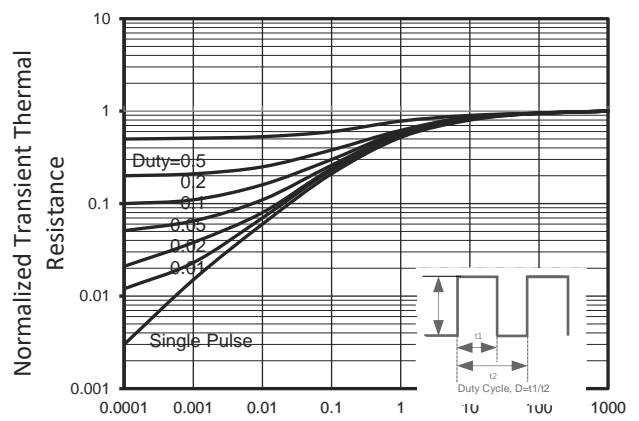
T_j-Junction Temperature(°C)
Gate Threshold Voltage



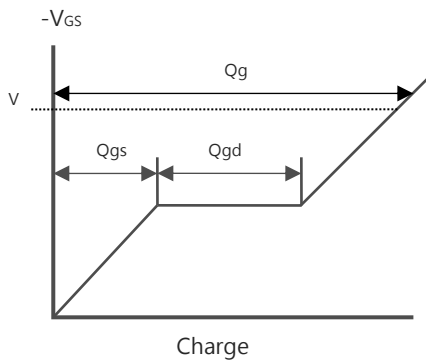
T_c-Case Temperature(°C)
Drain Current vs T_c



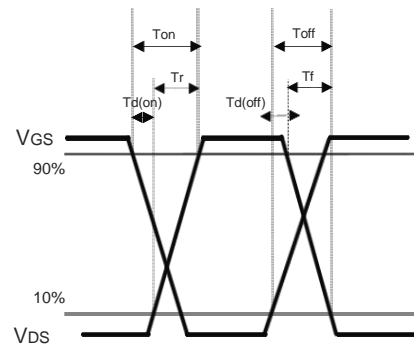
- V_{ds} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

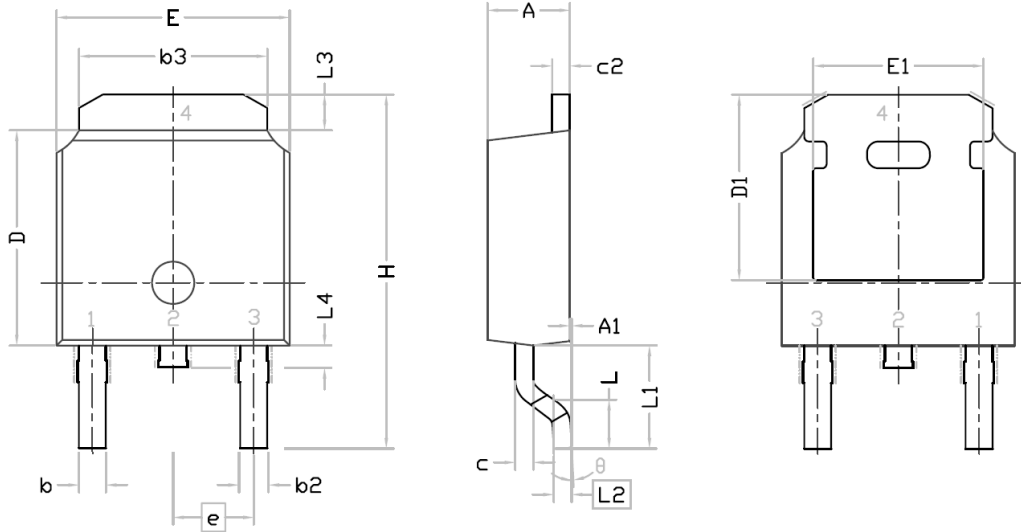


Gate Chrg Waveform



Switching Time Waveform

TO-252 PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.380	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.640	0.880	0.025	0.035
b2	0.770	1.140	0.030	0.045
b3	5.210	5.460	0.205	0.215
c	0.460	0.600	0.018	0.024
c2	0.460	0.580	0.018	0.023
D	6.000	6.223	0.236	0.245
D1	5.210	-	0.205	-
E	6.400	6.731	0.252	0.265
E1	4.400	-	0.173	-
e	2.286 BSC.		0.090 BSC.	
H	9.400	10.40	0.370	0.409
L	1.400	1.770	0.055	0.070
L1	2.743 REF.		0.108 REF.	
L2	0.508 BSC.		0.020 BSC.	
L3	0.890	1.270	0.035	0.050
L4	0.640	1.010	0.025	0.040
θ	0°	10°	0°	10°

Recommended Land Pattern

