

Single N-Channel MOSFET

DESCRIPTION

SMC4458M 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. These devices are well suited for high efficiency fast switching applications.

PART NUMBER INFORMATION

SMC 4458 M - TR G
 a b c d e

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

FEATURES

$V_{DS}=40V$, $I_D=12.5A$

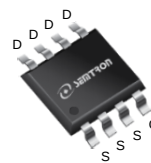
$R_{DS(ON)}=10m\Omega(Typ.)@V_{GS}=10V$

$R_{DS(ON)}=14m\Omega(Typ.)@V_{GS}=4.5V$

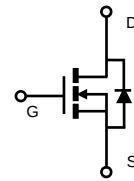
- ◆ 100% EAS Guaranteed
- ◆ Low Gate Charge
- ◆ Improved dv/dt Capability

APPLICATIONS

- ◆ Power Management
- ◆ DC/DC Power System



SOP-8



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	Continuous Drain Current	$T_A=25^{\circ}C$	12.5
		$T_A=70^{\circ}C$	9.9
I_{DM}	Pulsed Drain Current ^B	50	A
I_{AS}	Avalanche Current ^B	30	A
EAS	Single Pulse Avalanche energy $L=0.1mH$ ^B	45	mJ
P_D	Power Dissipation ^A	$T_A=25^{\circ}C$	3.1
		$T_A=70^{\circ}C$	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	$t \leq 10s$	40	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	70	
$R_{\theta JC}$	Thermal Resistance Junction to Case		25	

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

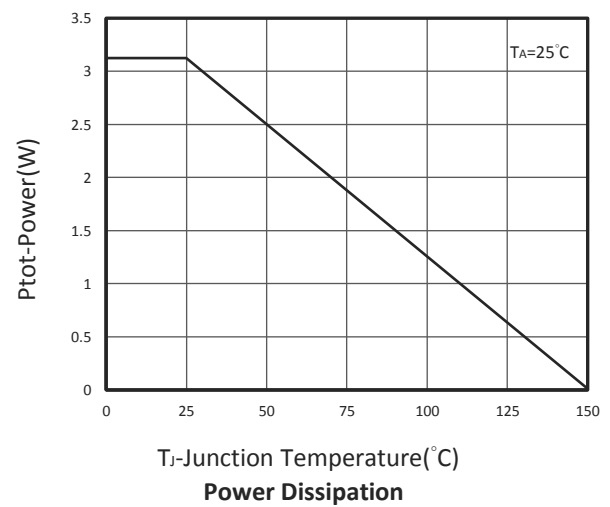
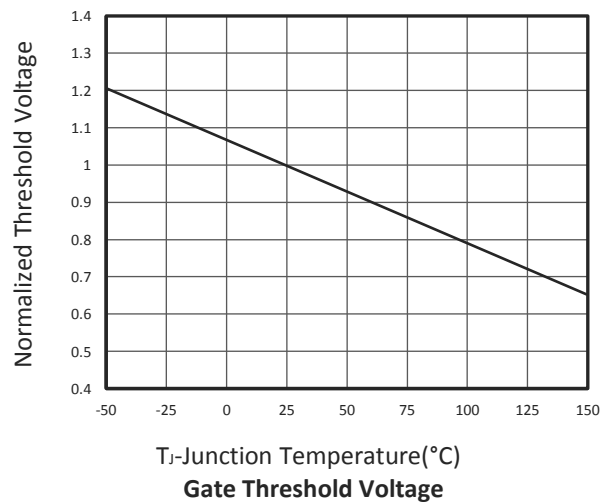
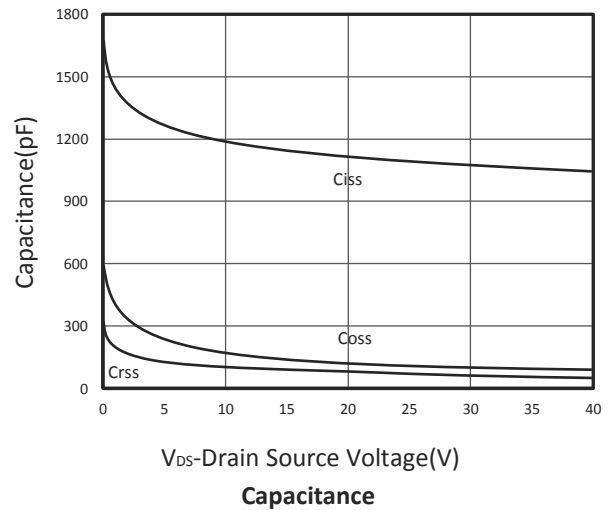
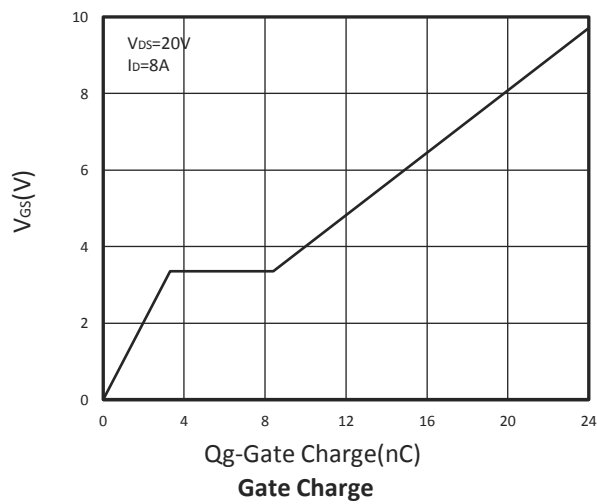
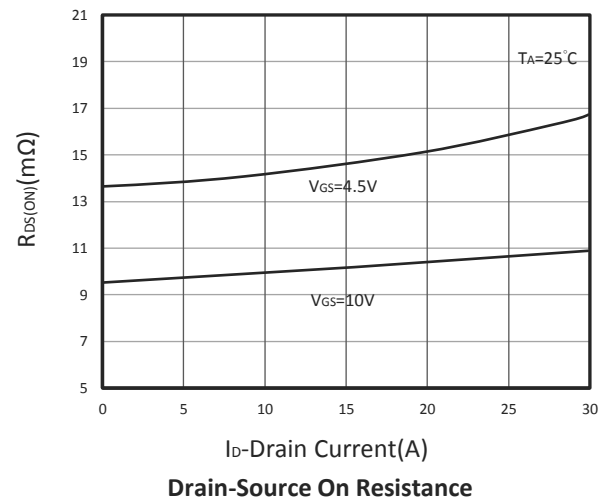
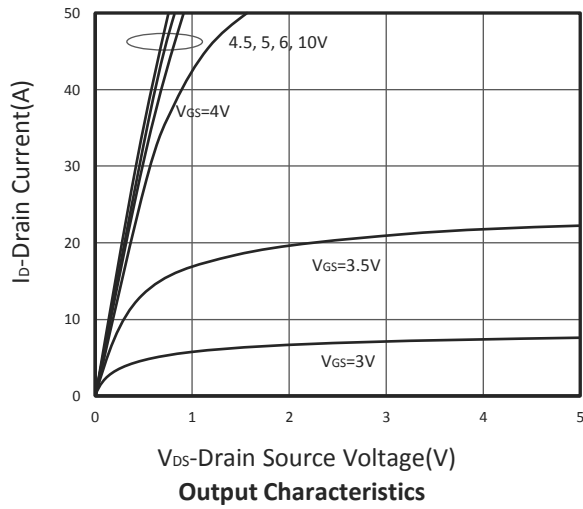
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.2	1.7	2.5	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±20V			±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V, T _J =25°C			1	μA
		V _{DS} =32V, V _{GS} =0V, T _J =75°C			10	
R _{DS(ON)}	Drain-source On-Resistance [Ⓟ]	V _{GS} =10V, I _D =12.5A V _{GS} =4.5V, I _D =8A		10 14	12 17	mΩ
G _{fs}	Forward Transconductance	V _{DS} =5V, I _D =8A		33		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage [Ⓟ]	I _S =1A, V _{GS} =0V			1.0	V
I _S	Diode Continuous Forward Current				12.5	A
t _{rr}	Revese Recovery Time	I _S =8A, dI/dt=100A/μs		10		ns
Q _{rr}	Revese Recovery Charge			3.5		nC
Dynamic and Switching Parameters [Ⓔ]						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _D =8A		24.8	30.1	nC
Q _g	Total Gate Charge (4.5V)			11.8	13.9	
Q _{gs}	Gate-Source Charge			3.6	4.3	
Q _{gd}	Gate-Drain Charge			4.7	6.6	
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz		1110	1430	pF
C _{oss}	Output Capacitance			108	141	
C _{rss}	Reverse Transfer Capacitance			82	115	
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		2.5		Ω
t _{d(on)}	Turn-On Time	V _{DD} =20V, V _{GEN} =10V R _G =3.3Ω, I _D =1A		7.8	16	nS
t _r				3	6	
t _{d(off)}	Turn-Off Time			28	49	
t _f				3.1	5.9	

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

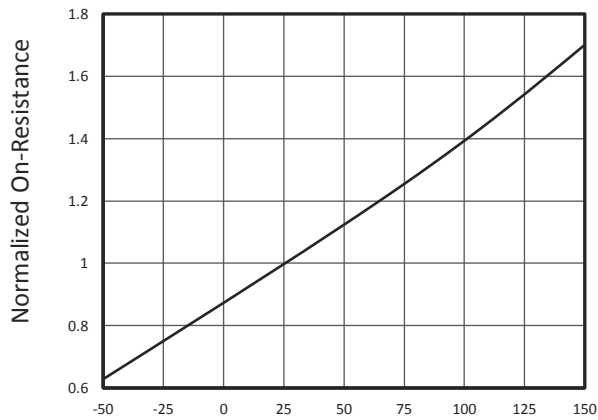
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150°C (initial temperature T_J=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150°C.
- D. Pulse test width ≤300μs and duty cycle ≤ 2%.
-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

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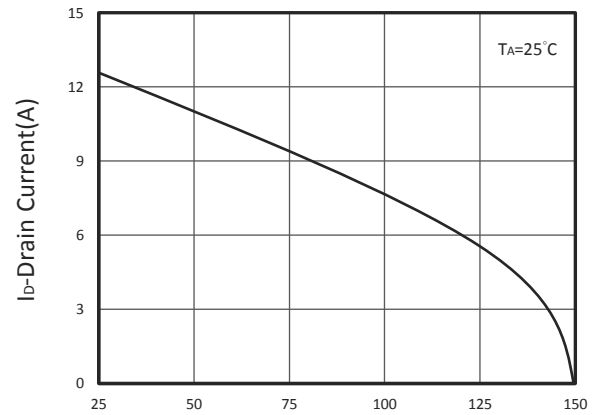
TYPICAL CHARACTERISTICS



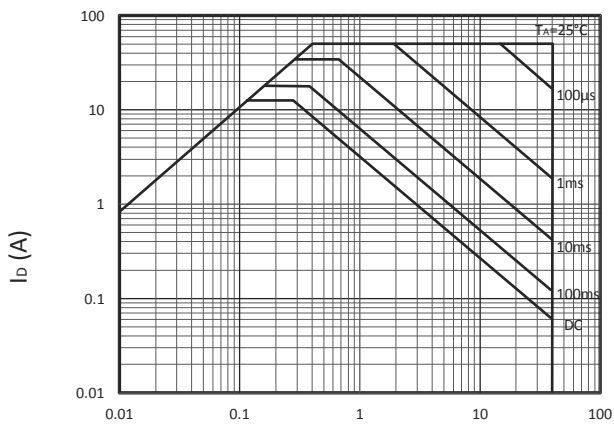
TYPICAL CHARACTERISTICS



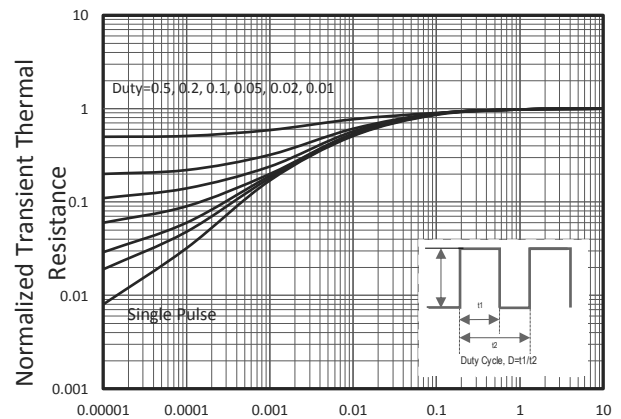
T_J -Junction Temperature(°C)
Drain-Source On Resistance



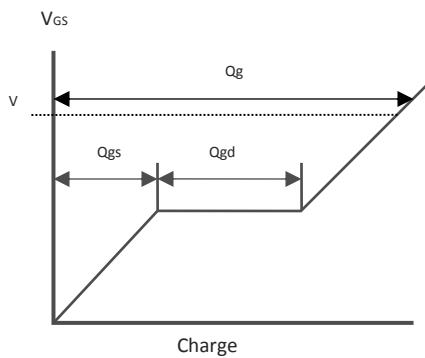
T_J -Junction Temperature(°C)
Drain Current vs T_J



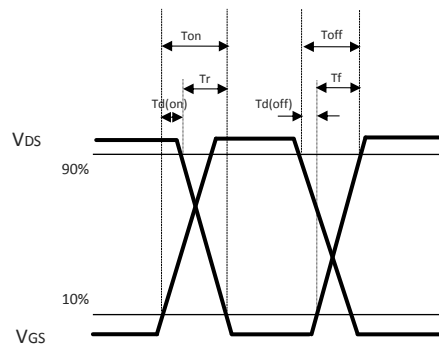
V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

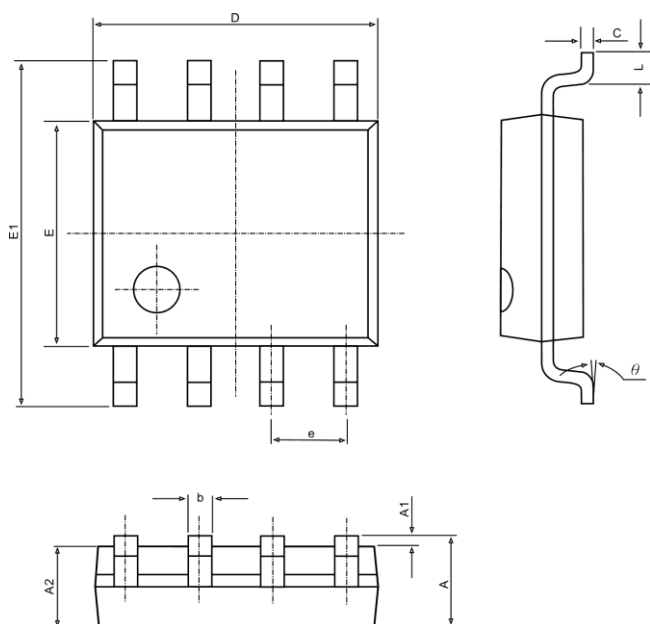


Gate Chrg Waveform

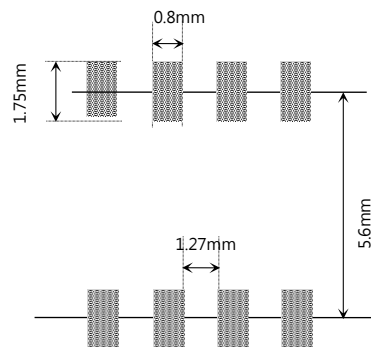


Switching Time Waveform

■ SOP-8 PACKAGE DIMENSIONS



Recommended Land Pattern



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.300	1.500	0.051	0.059
b	0.390	0.490	0.015	0.019
c	0.200	0.250	0.008	0.010
D	4.800	5.100	0.189	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050 BSC	
L	0.500	0.800	0.020	0.031
θ	0°	8°	0°	8°