

## Single P-Channel MOSFET

### DESCRIPTION

SMC5453H is the P-Channel MOSFET, uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. With the excellent thermal resistance, the TO-252 package, this device is well suited for high current applications.

### PART NUMBER INFORMATION

**SMC 5453 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

**$V_{DS}=-40V$ ,  $I_D=-52A$**

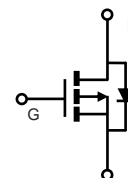
$R_{DS(ON)}=9.5m\Omega(Typ.)@V_{GS}=-10V$

$R_{DS(ON)}=13m\Omega(Typ.)@V_{GS}=-4.5V$

- ◆ High power and current handling capability

### APPLICATIONS

- ◆ LED Application
- ◆ Power Management



### 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	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^{\circ}C$	-52
		$T_C=100^{\circ}C$	-32.9
$I_{DM}$	Pulsed Drain Current <sup>B</sup>	-208	A
$I_D$	Continuous Drain Current	$T_A=25^{\circ}C$	-17.3
		$T_A=70^{\circ}C$	-13.8
$P_D$	Power Dissipation <sup>A</sup>	$T_A=25^{\circ}C$	6.3
		$T_A=70^{\circ}C$	4
$I_{AS}$	Avalanche Current <sup>B</sup>	-30	A
$E_{AS}$	Single Pulse Avalanche energy $L=0.1mH$ <sup>B</sup>	45	mJ
$P_D$	Power Dissipation <sup>C</sup>	$T_C=25^{\circ}C$	56.8
		$T_C=100^{\circ}C$	22.7
$T_J$	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 <sup>A</sup>		20	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient <sup>AC</sup>	$t \leq 10s$	50	
$R_{\theta JC}$	Thermal Resistance Junction to Case	Steady-State	2.2	

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

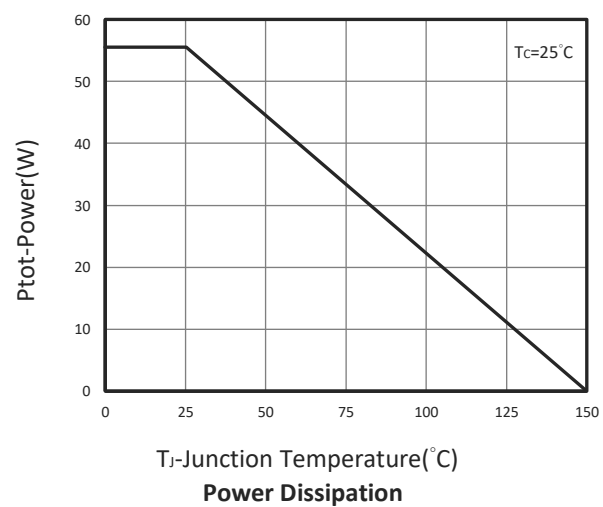
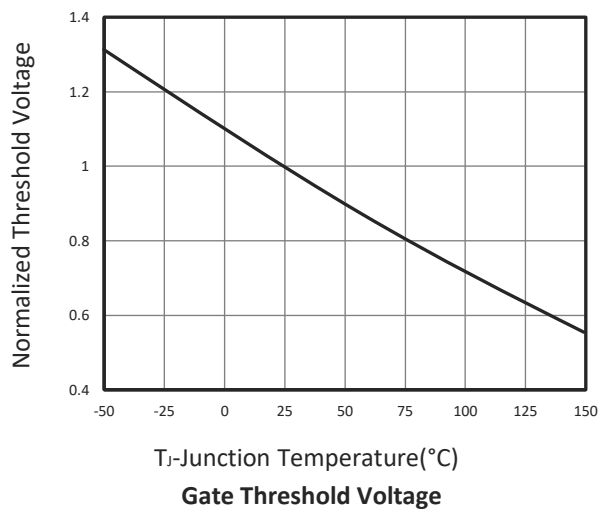
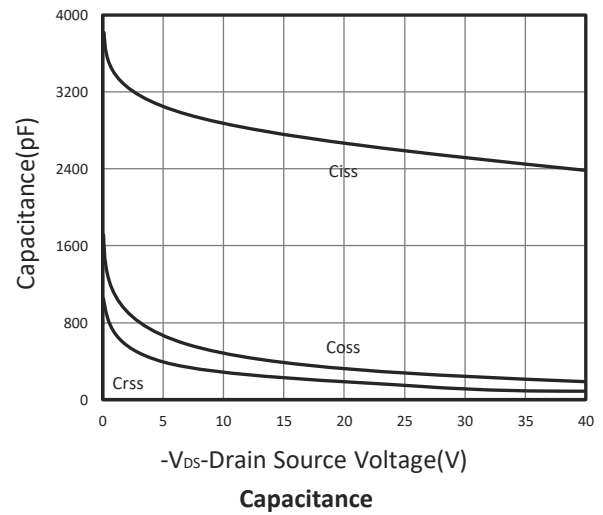
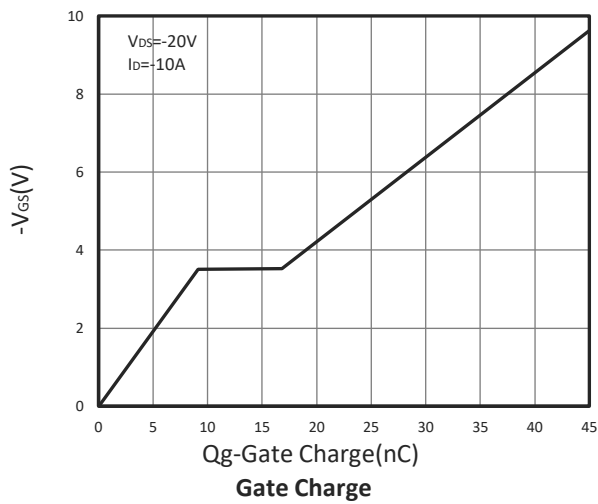
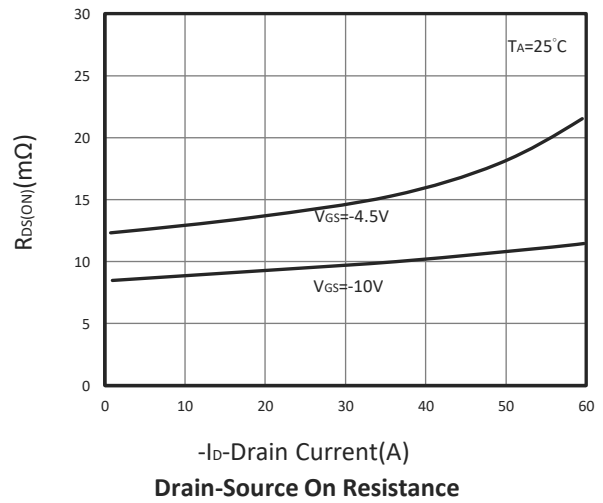
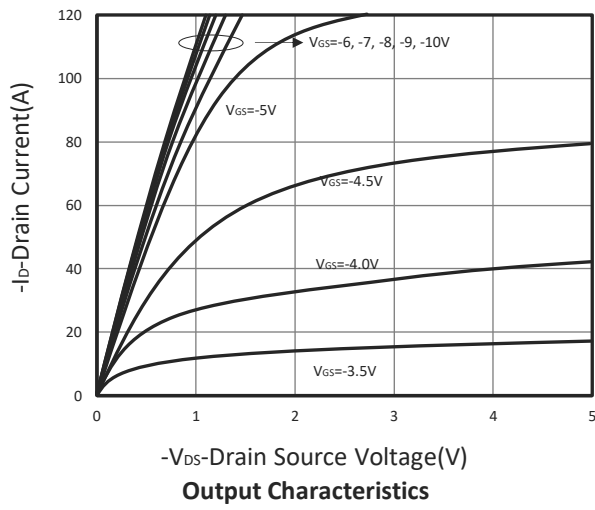
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250 $\mu$ A	-40			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250 $\mu$ A	-1	-1.6	-2.5	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = $\pm$ 20V			$\pm$ 100	nA
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =25 $^\circ$ C			-1	$\mu$ A
		V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V, T <sub>J</sub> =75 $^\circ$ C			-10	
R <sub>DS(ON)</sub>	Drain-source On-Resistance <sup>D</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-17.3A V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-12A		9.5 13	12 17	m $\Omega$
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-10A		38		S
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage <sup>D</sup>	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V			-1	V
I <sub>S</sub>	Diode Continuous Forward Current				-26	A
<b>Dynamic and Switching Parameters<sup>E</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V I <sub>D</sub> =-10A		47.1	63.6	nC
Q <sub>g</sub>	Total Gate Charge (4.5V)			22		
Q <sub>gs</sub>	Gate-Source Charge			8		
Q <sub>gd</sub>	Gate-Drain Charge			9		
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, f=1MHz		2750		pF
C <sub>oss</sub>	Output Capacitance			255		
C <sub>rss</sub>	Reverse Transfer Capacitance			145		
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =-20V, V <sub>GEN</sub> =-10V R <sub>G</sub> =6 $\Omega$ I <sub>D</sub> =-1A		24	46	nS
t <sub>r</sub>				12	23	
t <sub>d(off)</sub>	Turn-Off Time			47	89	
t <sub>f</sub>				28	53	

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

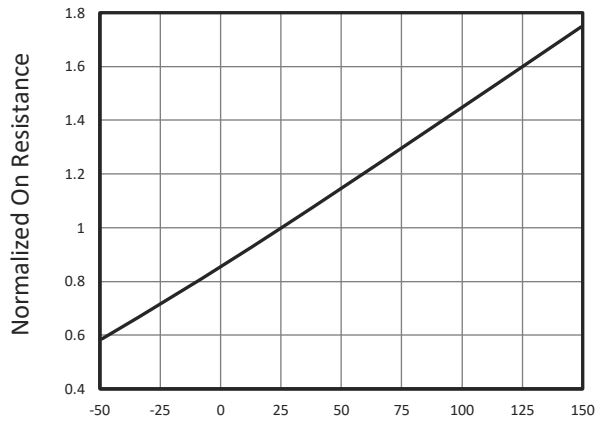
- A. Surface mounted on FR4 board using 1 in<sup>2</sup> pad size.
- B. Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150 $^\circ$ C.
- C. Using  $\leq$  10s junction-to-ambient thermal resistance is base on T<sub>J(MAX)</sub>=150 $^\circ$ C.
- D. Pulse test width  $\leq$ 300 $\mu$ s and duty cycle  $\leq$  2%.
- E. Guaranteed by design, not subject to production testing.

The products and product specifications contained herein are subject to change without notice to improve performance characteristics. Consult us, or our representatives before use, to confirm that the information in this datasheet is up to date. We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this datasheet.

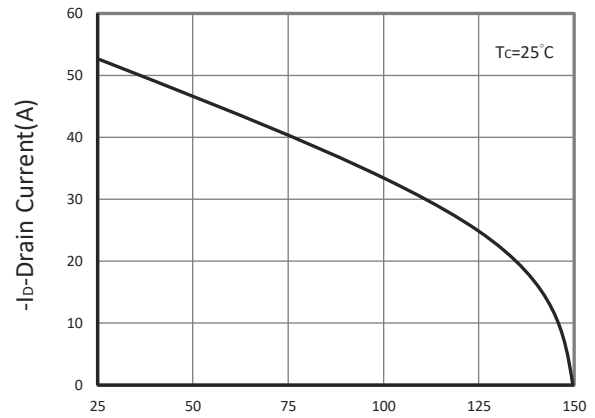
## TYPICAL CHARACTERISTICS



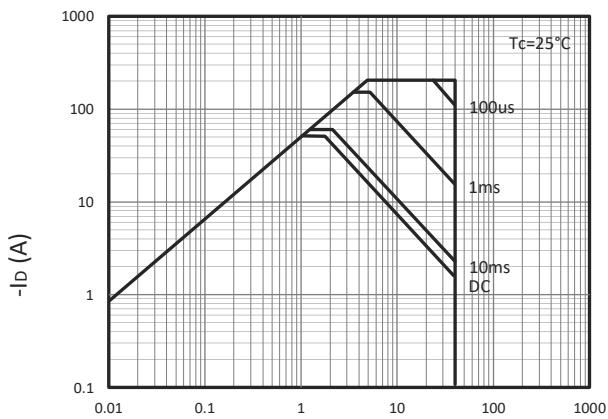
## TYPICAL CHARACTERISTICS



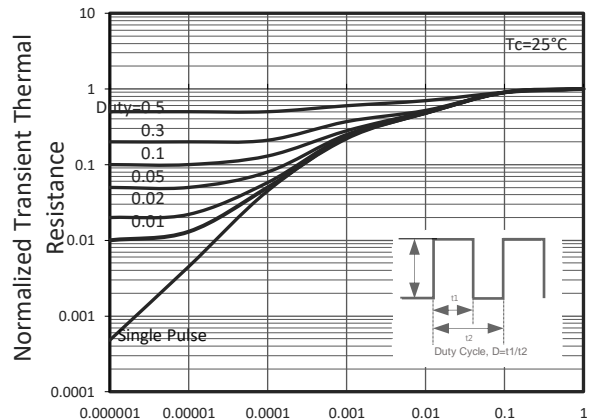
$R_{DS(ON)}$  vs Junction Temperature



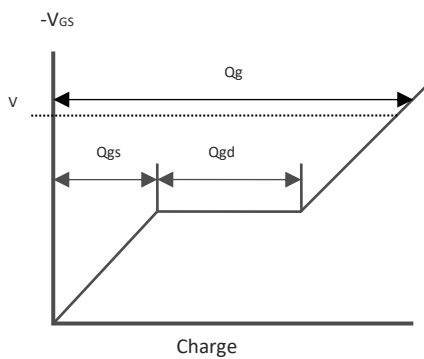
Drain Current vs  $T_c$



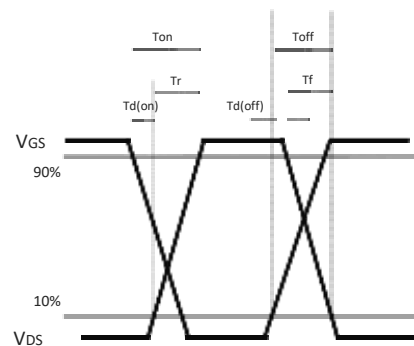
Maximum Safe Operation Area



Thermal Transient Impedance

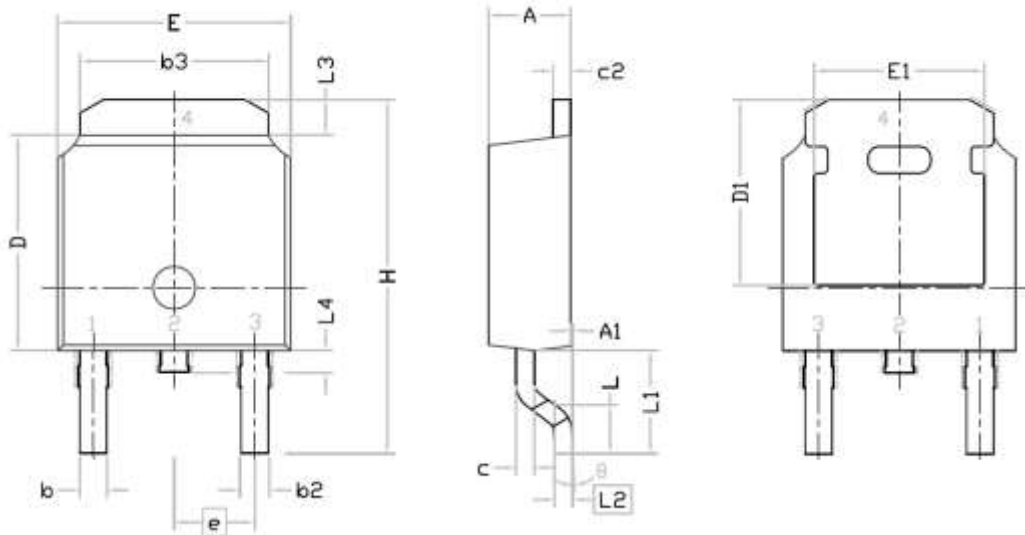


Gate Charge Waveform



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

