

# HC4185

## 40V P-Channel MOSFET

### General Description

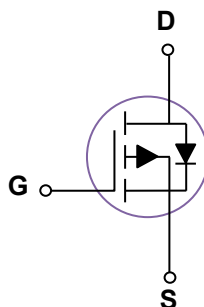
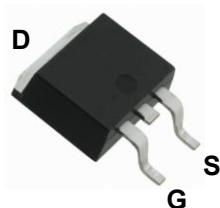
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### Features

$V_{DS}$	-40V
$I_D$ (at $V_{GS}=-10V$ )	-40A
$R_{DS(ON)}$ (at $V_{GS}=-10V$ )	22mΩ(Max)
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ )	30mΩ(Max)

**100% UIS TESTED!**  
**100% ΔVds TESTED!**

TO252



### Absolute Maximum Ratings $T_A=25^{\circ}C$ unless otherwise noted

Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	$V_{DS}$	-40	V	
Gate-Source Voltage	$V_{GS}$	±20	V	
Drain Current-Continuous	TC=25°C	$I_D$	-40	A
	TC=100°C	$I_D$	-27	A
Drain Current – Pulsed	$I_{DM}$	-160	A	
Maximum Power Dissipation	$P_D$	62	W	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C	

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		3.6	°C /W
Thermal Resistance junction-to-Ambient	$R_{\theta JA}$		62	°C /W

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$			1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-15A$		18	22	m $\Omega$
		$V_{GS}=-4.5V, I_D=-10A$		25	30	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
$C_{iSS}$	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V,$ $F=1.0MHz$		2100		pF
$C_{OSS}$	Output Capacitance			160		pF
$C_{rSS}$	Reverse Transfer Capacitance			130		pF
<b>SWITCHING PARAMETERS</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=-20V, I_D=-1A,$ $V_{GS}=-10V,$ $R_G=6\Omega$		18		nS
$t_r$	Turn-on Rise Time			4.2		nS
$t_{d(off)}$	Turn-Off Delay Time			72		nS
$t_f$	Turn-Off Fall Time			10		nS
$Q_g$	Total Gate Charge	$V_{DS}=-20V, I_D=-5A,$ $V_{GS}=-4.5V$		17		nC
$Q_{gs}$	Gate-Source Charge			6		nC
$Q_{gd}$	Gate-Drain Charge			5.1		nC
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_{SD}=-1A$		0.72	1.4	V

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

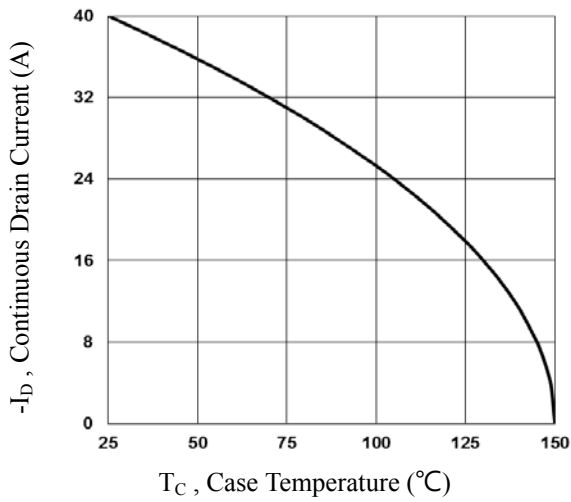


Fig.1 Continuous Drain Current vs.  $T_C$

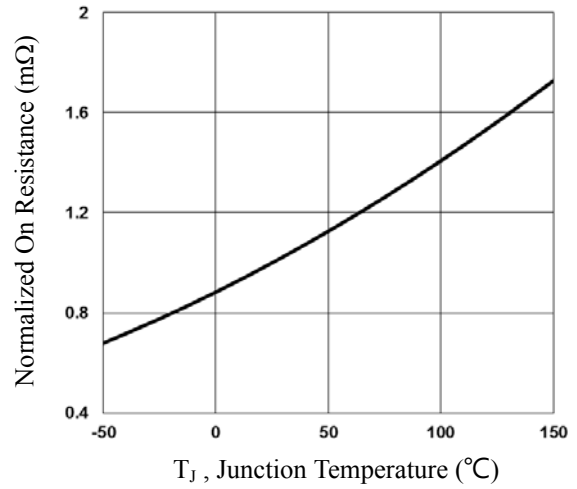


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

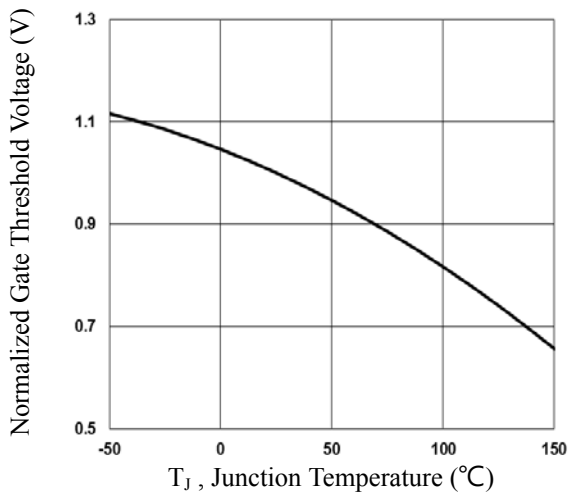


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

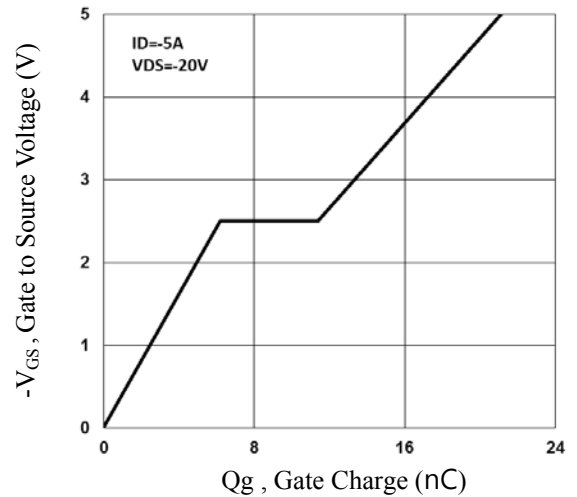


Fig.4 Gate Charge Waveform

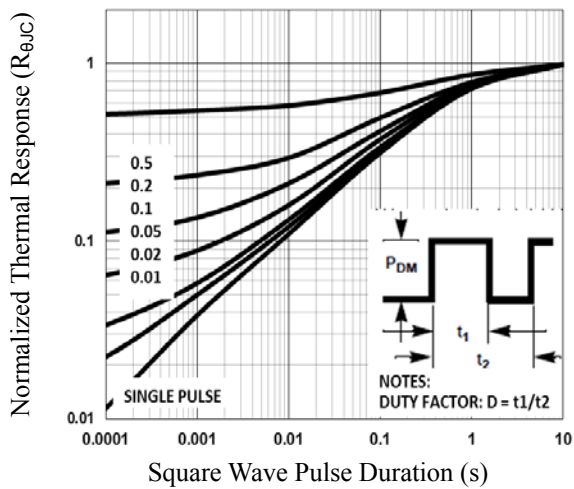


Fig.5 Normalized Transient Impedance

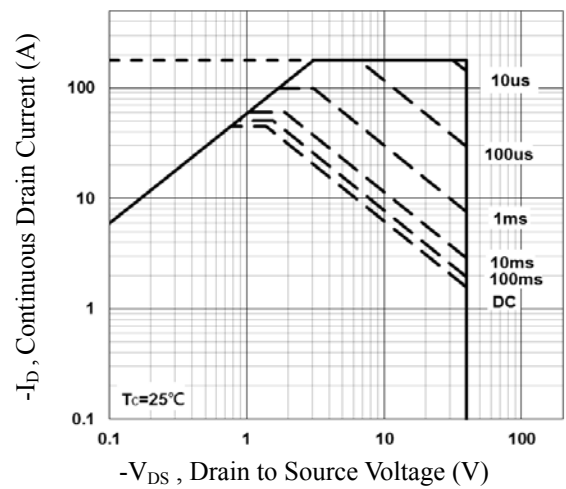


Fig.6 Maximum Safe Operation Area

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

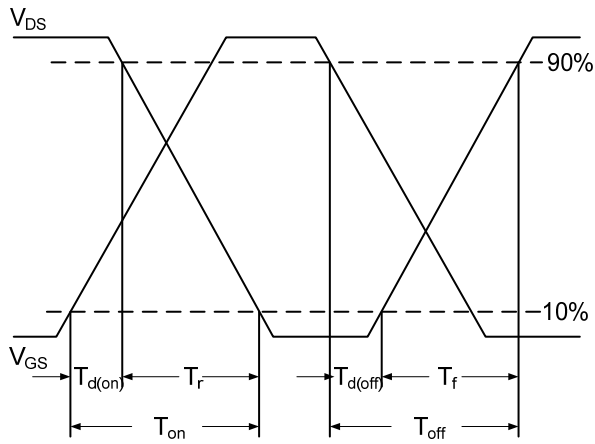


Fig.7 Switching Time Waveform

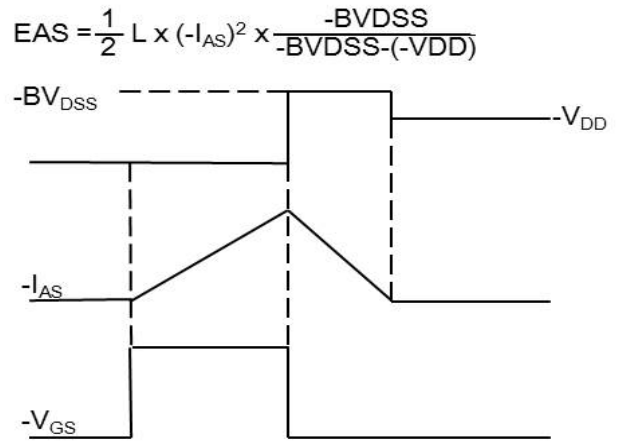
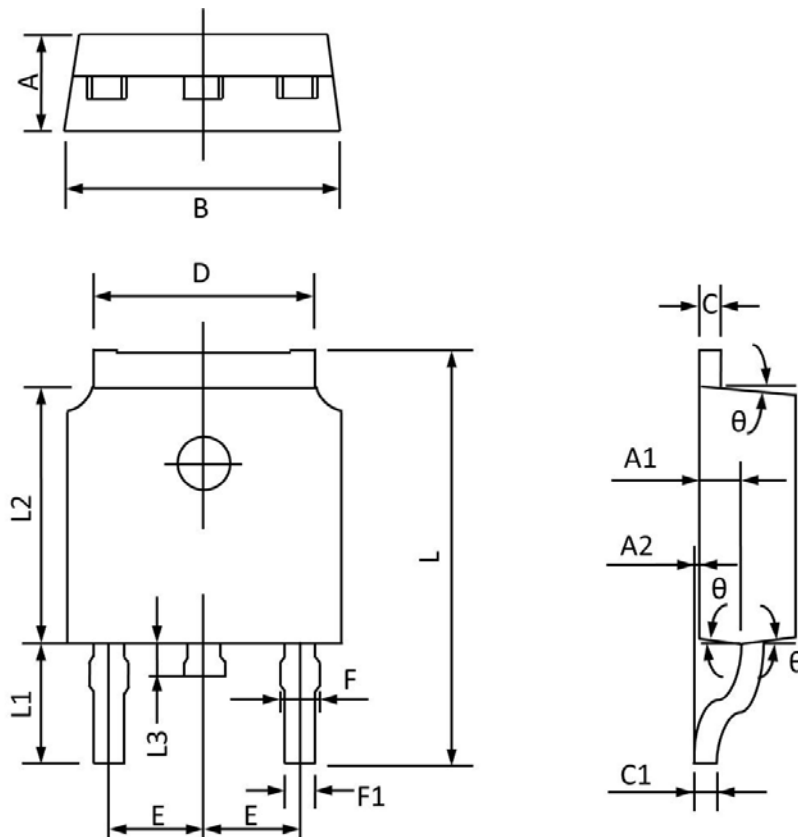


Fig.8 EAS Waveform

TO252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°