

# 30V P-Channel MOSFETs

## General Description

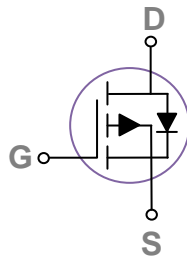
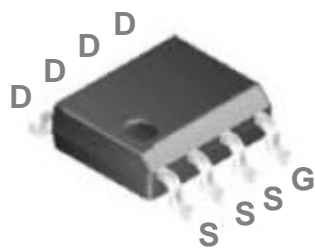
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
-30V	20mΩ	-9.2A

## Features

- 30V, -9.1A,  $R_{DS(ON)} = 20m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

## SOP8 Pin Configuration



## Applications

- MB / VGA / Vcore
- POL Applications
- Load Switch
- LED Application

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ , $t=10\text{sec}$ )	-9.2	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	-5.1	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-50	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	2.1	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.017	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	60	$^\circ\text{C}/\text{W}$

**MOSFET ELECTRICAL CHARACTERISTICS** $T_a=25^\circ\text{C}$  unless otherwise specified**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.03	---	V/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu\text{A}$
		$V_{DS}=-24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-9.1A$	---	16.5	20	$\text{m}\Omega$
		$V_{GS}=-4.5V, I_D=-7.0A$	---	25.6	32	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4	---	$\text{mV}/^\circ\text{C}$
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	6.8	---	S

**Dynamic and switching Characteristics**

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-5A$	---	11	17	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	3.4	6	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	4.2	8	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega$ $I_D=-1A$	---	5.8	11	ns
$T_r$	Rise Time <sup>2,3</sup>		---	18.8	36	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	46.9	89	
$T_f$	Fall Time <sup>2,3</sup>		---	12.3	23	
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$	---	1250	1820	pF
$C_{oss}$	Output Capacitance		---	160	235	
$C_{rss}$	Reverse Transfer Capacitance		---	90	130	

**Drain-Source Diode Characteristics and Maximum Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-8	A
$I_{SM}$	Pulsed Source Current		---	---	-16	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

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

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

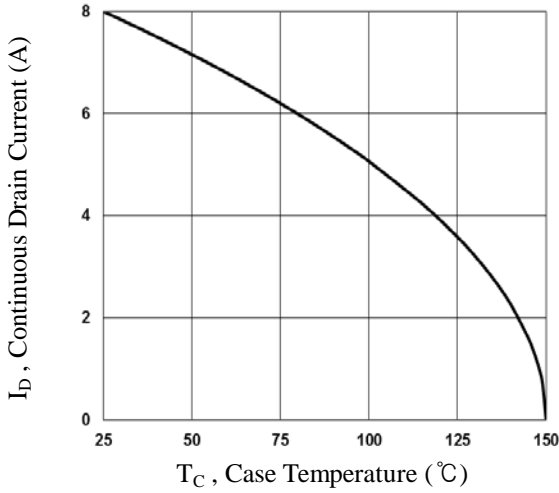


Fig. 1 Continuous Drain Current vs.  $T_C$

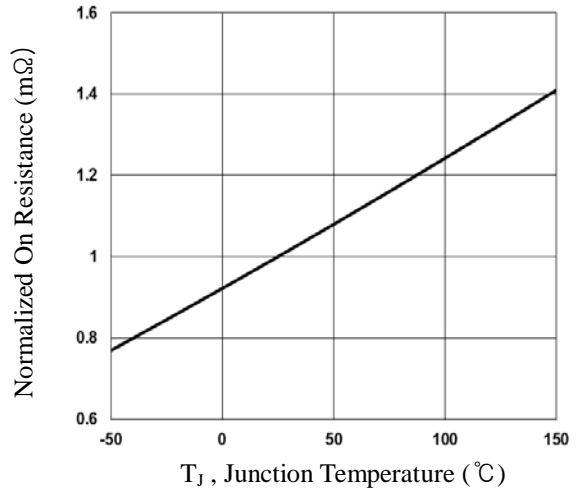


Fig. 2 Normalized  $R_{DS(on)}$  vs.  $T_J$

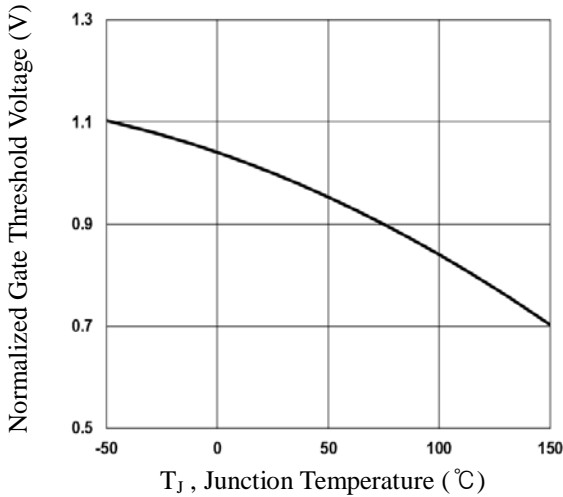


Fig. 3 Normalized  $V_{th}$  vs.  $T_J$

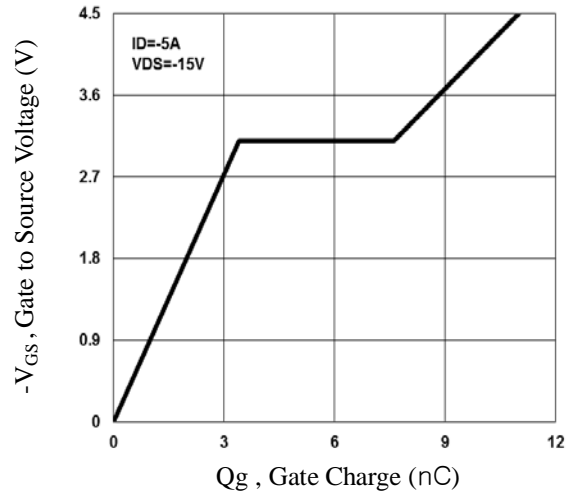


Fig. 4 Gate Charge Waveform

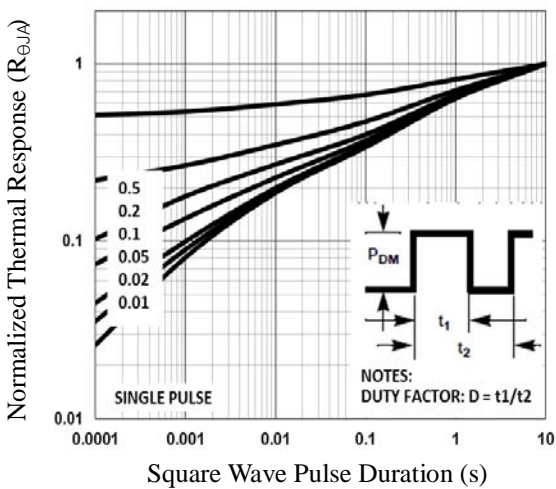


Fig. 5 Normalized Transient Impedance

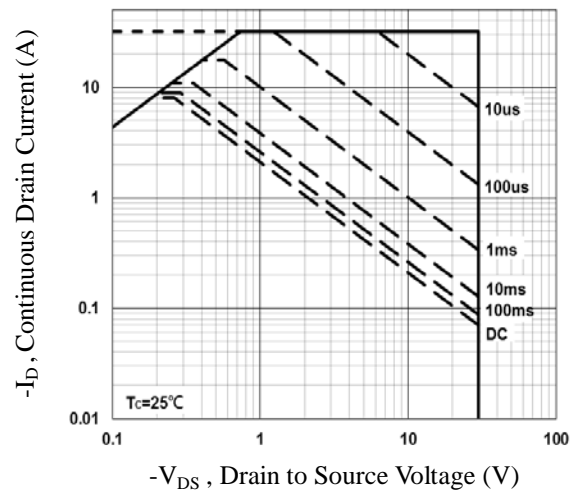
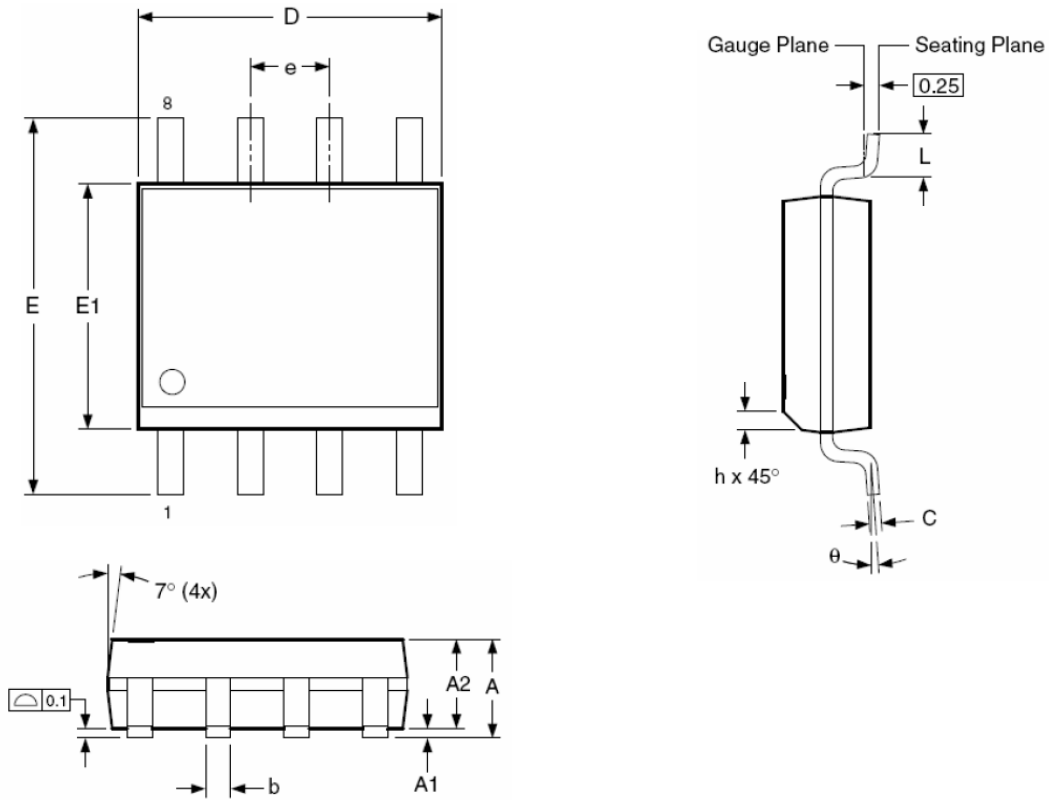


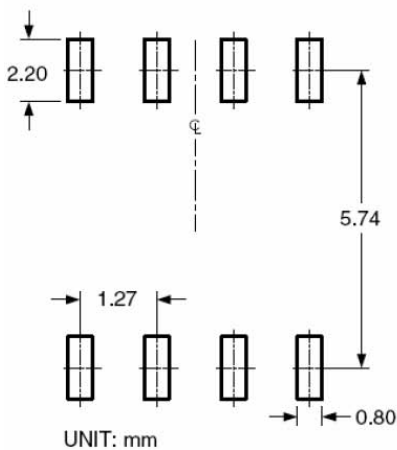
Fig. 6 Maximum Safe Operation Area

## SOP-8 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)



### RECOMMENDED LAND PATTERN



### Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	1.35	1.65	1.75
A1	0.10	—	0.25
A2	1.25	1.50	1.65
b	0.31	—	0.51
c	0.17	—	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
e	1.27 BSC		
E	5.80	6.00	6.20
h	0.25	—	0.50
L	0.40	—	1.27
θ	0°	—	8°

### Dimensions in inches

Symbols	Min.	Nom.	Max.
A	0.053	0.065	0.069
A1	0.004	—	0.010
A2	0.049	0.059	0.065
b	0.012	—	0.020
c	0.007	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.157
e	0.050 BSC		
E	0.228	0.236	0.244
h	0.010	—	0.020
L	0.016	—	0.050
θ	0°	—	8°

### NOTES:

1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.