

# P-Channel Trench MOSFET

## Description

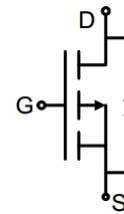
The G090P02S uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

## General Features

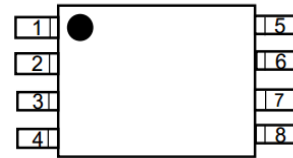
- $V_{DS}$  -20V
- $I_D$  (at  $V_{GS} = -10V$ ) -11A
- $R_{DS(ON)}$  (at  $V_{GS} = -4.5V$ ) < 9m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = -2.5V$ ) < 12.5m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant

## Application

- Power switch
- DC/DC converters



Schematic diagram



Marking and pin assignment



SOP-8

Device	Package	Marking	Packaging
G090P02S	SOP-8	G090P02	4000pcs/Reel

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Continuous Drain Current	$I_D$	-11	A
Pulsed Drain Current (note1)	$I_{DM}$	-44	A
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Power Dissipation	$P_D$	3.3	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 To 150	$^\circ\text{C}$

## Thermal Resistance

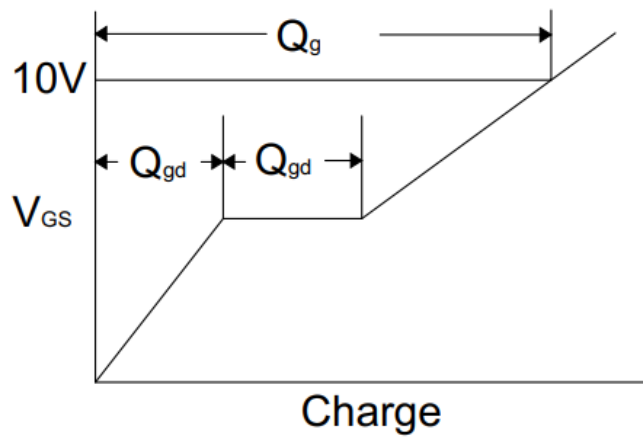
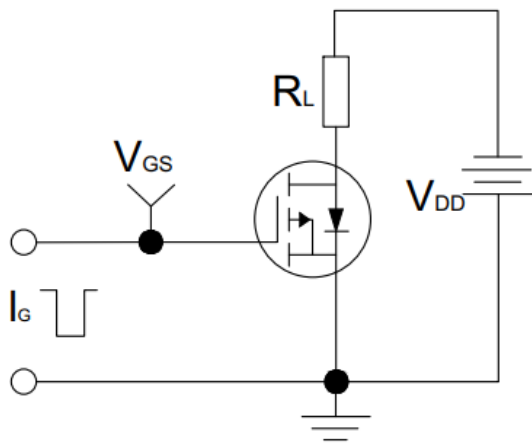
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	38	$^\circ\text{C/W}$

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	-1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 12V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-0.65	-1.1	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -1A$	--	7.5	9.0	m $\Omega$
		$V_{GS} = -2.5V, I_D = -1A$	--	10	12.5	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -1A$	--	90	--	S
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = -10V,$ $f = 1.0\text{MHz}$	--	2225	--	pF
Output Capacitance	$C_{oss}$		--	412	--	
Reverse Transfer Capacitance	$C_{rss}$		--	281	--	
Total Gate Charge	$Q_g$	$V_{DD} = -10V,$ $I_D = -1A,$ $V_{GS} = -10V$	--	47	--	nC
Gate-Source Charge	$Q_{gs}$		--	5	--	
Gate-Drain Charge	$Q_{gd}$		--	10	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -10V,$ $I_D = -1A,$ $R_G = 3\Omega$	--	3.5	--	ns
Turn-on Rise Time	$t_r$		--	6	--	
Turn-off Delay Time	$t_{d(off)}$		--	67	--	
Turn-off Fall Time	$t_f$		--	22	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	-11	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	-44	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = -1A, V_{GS} = 0V$	--	--	1.2	V

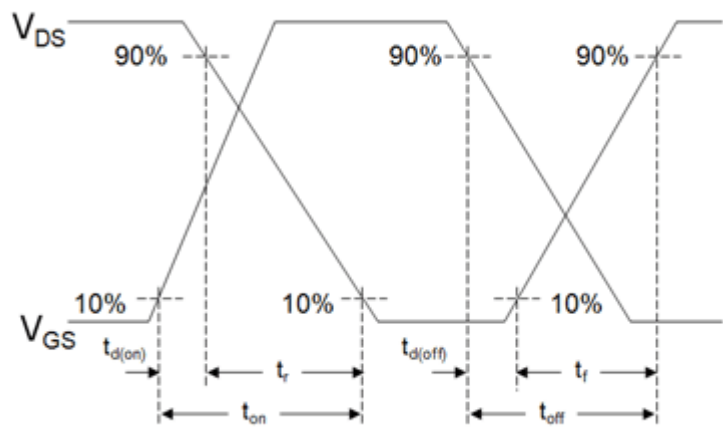
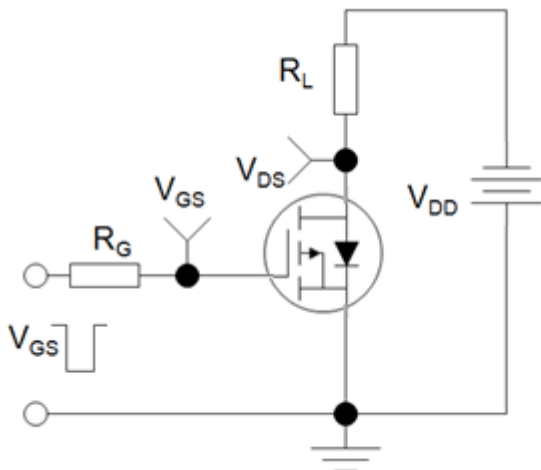
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

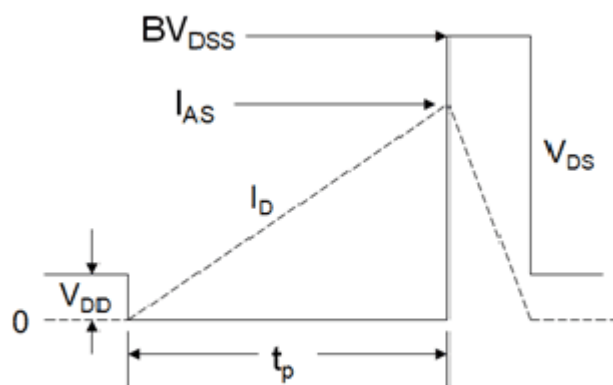
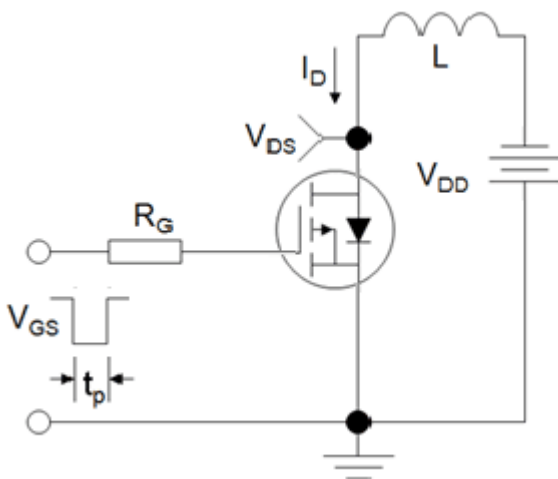
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics

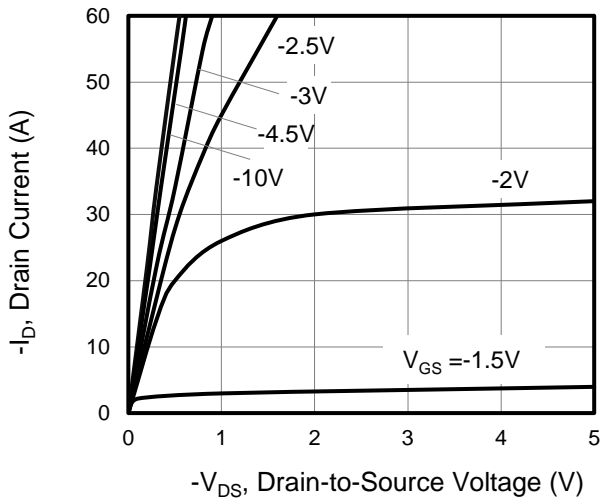


Figure 2. Transfer Characteristics

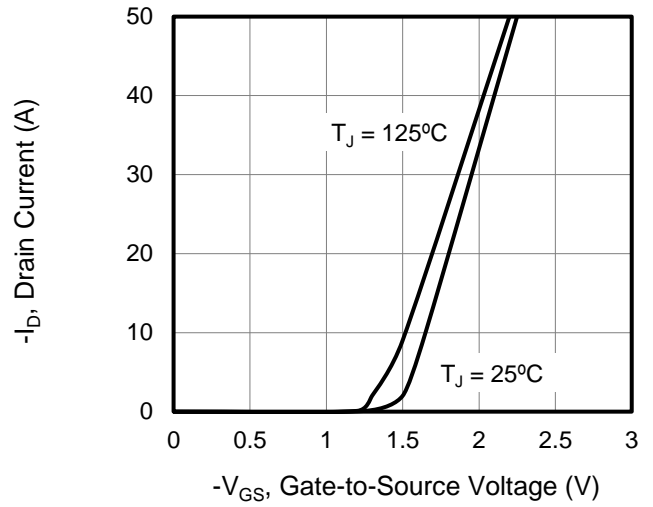


Figure 3. R<sub>DS(on)</sub>-Drain Current

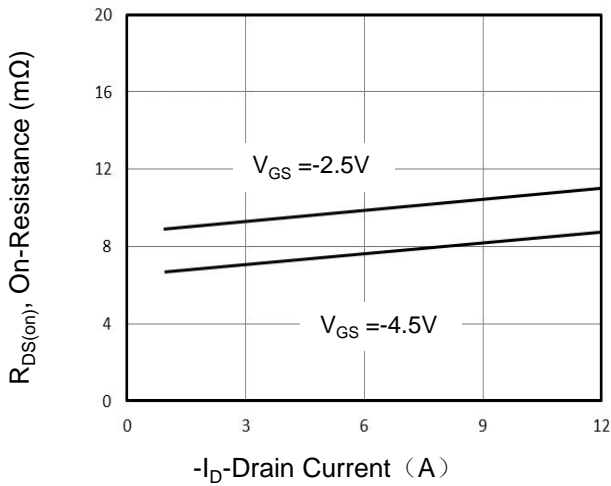


Figure 4. Gate Charge

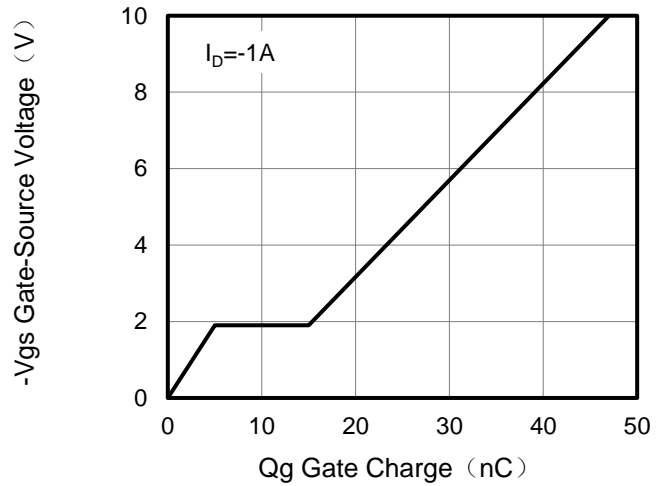


Figure 5. Capacitance vs V<sub>ds</sub>

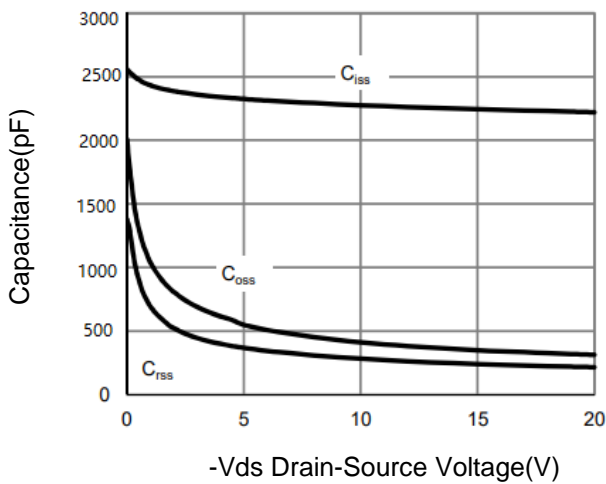
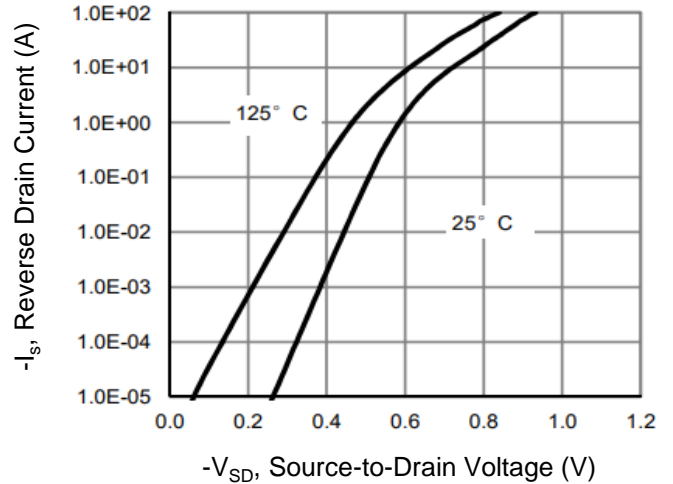


Figure 6. Source-Drain Diode Forward



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. Drain-Source On-Resistance

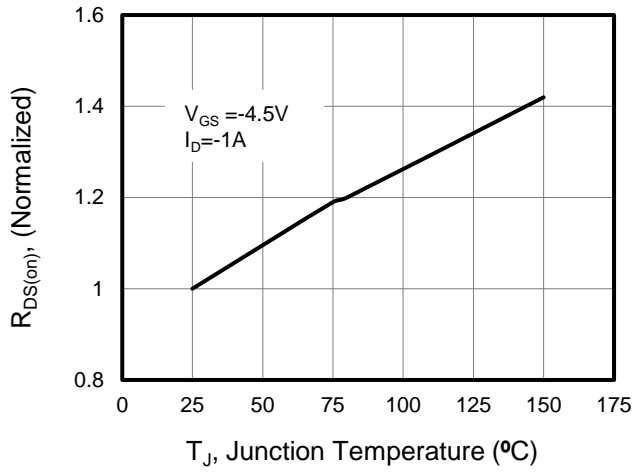
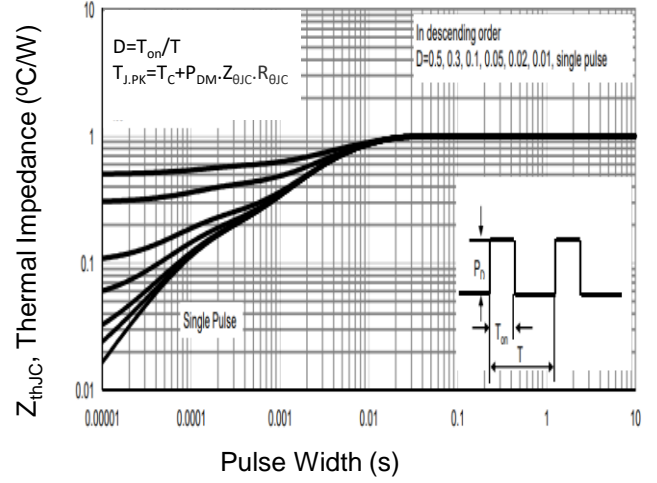
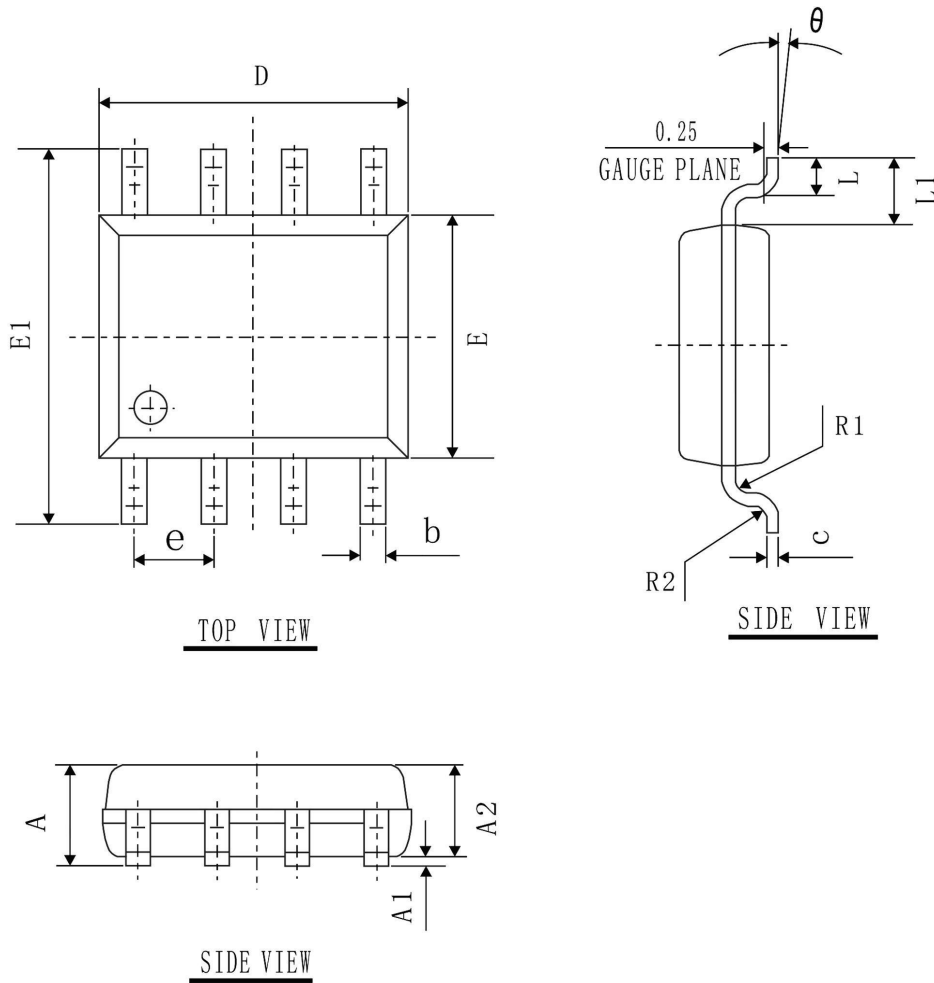


Figure 8. Normalized Maximum Transient Thermal Impedance



SOP-8 Package Information



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	1.40	1.60	1.80
A1	0.05	0.15	0.25
A2	1.35	1.45	1.55
b	0.30	0.40	0.50
c	0.153	0.203	0.253
D	4.80	4.90	5.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
L	0.45	0.70	1.00
$\theta$	2°	4°	6°
L1	1.04 REF		
e	1.27 BSC		
R1	0.07 TYP		
R2	0.07 TYP		