

## Complementary High Density Trench MOSFET

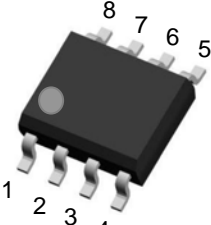
PRODUCT SUMMARY (N-Channel)		
$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m $\Omega$ ) Max
30V	6.5A	28 @ $V_{GS} = 10V, I_D = 6.5A$
		42 @ $V_{GS} = 4.5V, I_D = 5.0A$

PRODUCT SUMMARY (P-Channel)		
$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m $\Omega$ ) Max
-30V	-5A	60 @ $V_{GS} = -10V, I_D = -5A$
		90 @ $V_{GS} = -4.5V, I_D = -4A$

### Features

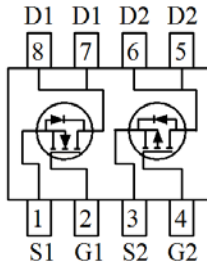
- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Fully Characterized Avalanche Voltage and Current
- Ordering information : GS8958(Lead(Pb)-free and halogen-free)





**SOP-8**

Pin 1: Source 2  
 Pin 2: Gate 2  
 Pin 3: Source 1  
 Pin 4: Gate 1  
 Pin 5 / 6: Drain 1  
 Pin 7 / 8: Drain 2



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

Symbol	Parameter	N-Channel	P-Channel	Units
$V_{DS}$	Drain-Source Voltage	30	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D$	Drain Current <sup>a</sup>	6.5	-5	A
$I_{DM}$	Drain Current <sup>b</sup> (Pulsed) <sup>a</sup>	28	-20	A
$P_D$	Total Power Dissipation <sup>a</sup> @ $T_A = 25^\circ\text{C}$	2.0	2.0	W
$T_j, T_{stg}$	Operating Junction and Storage Temperature Range <sup>a</sup>	-55 to +150	-55 to +150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient <sup>a</sup>	63.2	63.2	$^\circ\text{C/W}$

Note: a: Surface Mounted on FR4 Board,  $t \leq 5\text{sec}$ .  
 b: Pulse width limited by maximum junction temperature.

## N-Channel Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
<b>• Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	-1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>• On Characteristics<sup>c</sup></b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1.0	1.4	3.0	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> = 6.5A	-	22	28	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> = 5.0A	-	34	42	
gfs	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> = 5.0A	-	6.0	-	S
<b>• Dynamic Characteristics<sup>d</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	-	398	-	pF
C <sub>oss</sub>	Output Capacitance		-	67	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	61	-	
<b>• Switching Characteristics<sup>d</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =10V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V	-	7.4	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	1.7	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	1.3	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = 15V, R <sub>L</sub> =15Ω, I <sub>D</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω	-	8.0	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	11.2	-	
t <sub>d(off)</sub>	Turn-off Delay Time		-	17.2	-	
t <sub>f</sub>	Turn-off Fall Time		-	7.54	-	
<b>• Drain-Source Diode Characteristics</b>						
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =2.5A	-	-	1.3	V

Note:

b: Pulse width limited by maximum junction temperature.

c: Guaranteed by design , not subject to production testing .

### P-Channel Electrical Characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

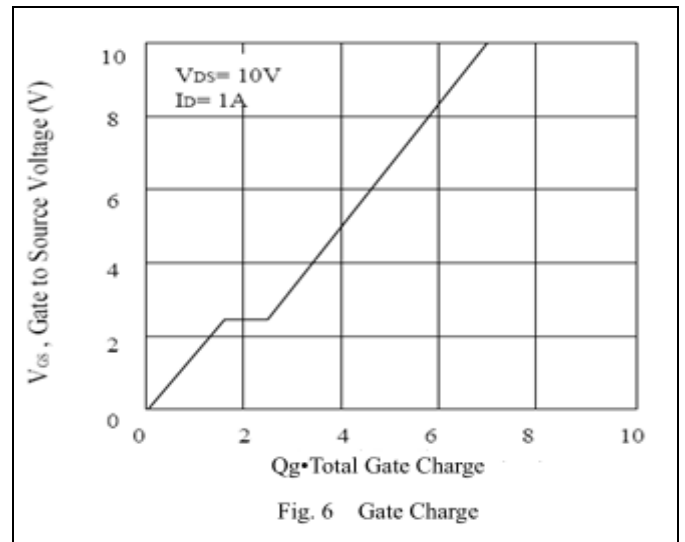
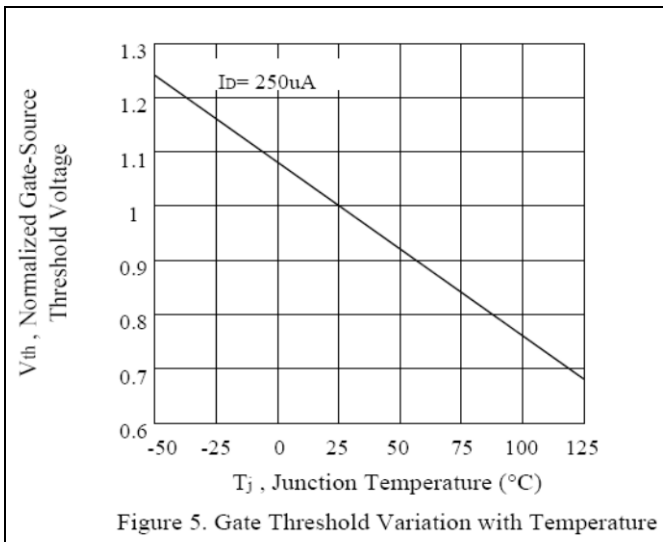
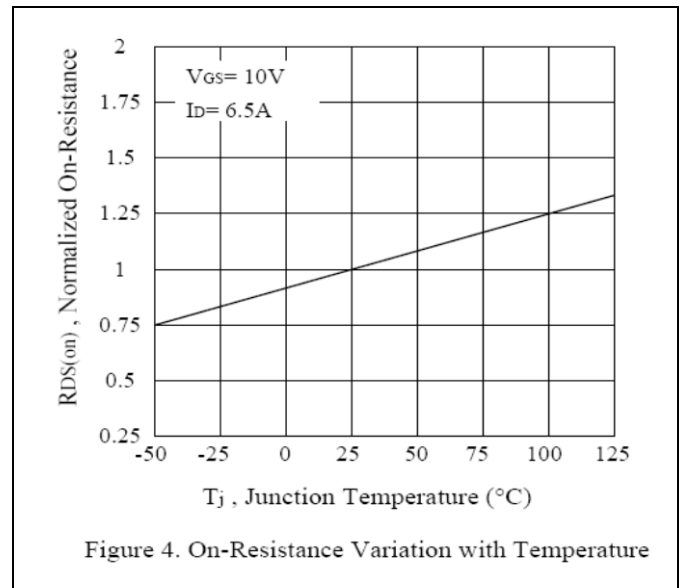
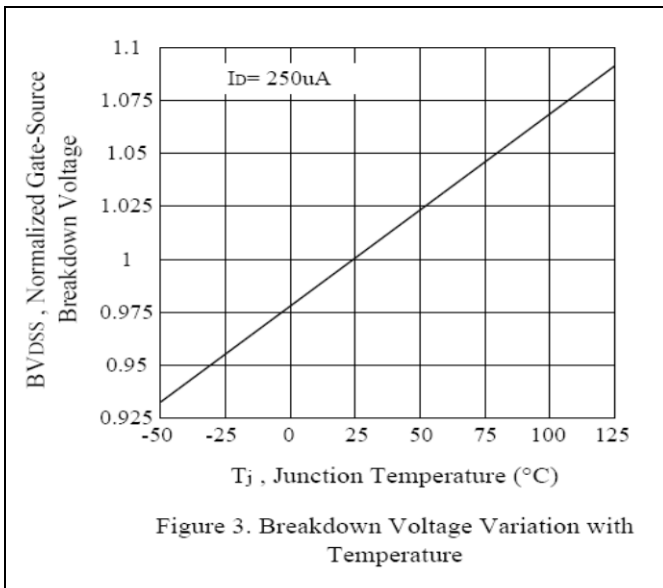
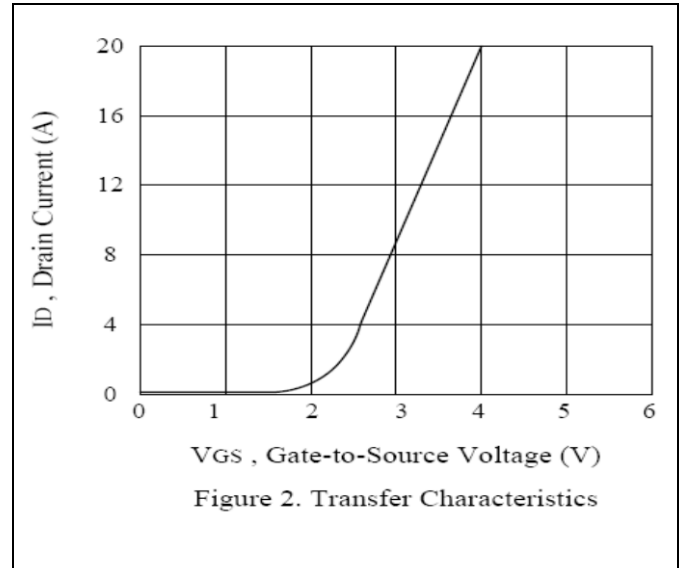
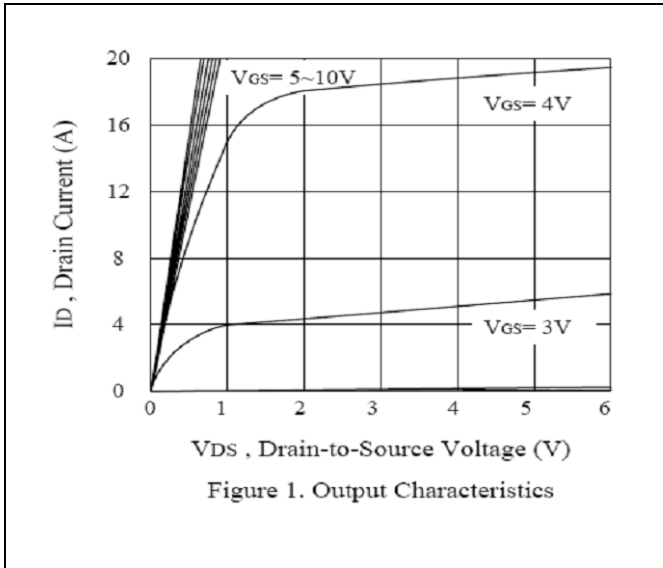
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
<b>• Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>• On Characteristics<sup>c</sup></b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-	-3.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-5A$	-	-	60	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	-	-	90	
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-5A$	-	8.6	-	S
<b>• Dynamic Characteristics<sup>d</sup></b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$	-	700	-	pF
$C_{oss}$	Output Capacitance		-	120	-	
$C_{rss}$	Reverse Transfer Capacitance		-	75	-	
<b>• Switching Characteristics<sup>d</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=-15V, I_D=-5A, V_{GS}=-10V$	-	14.7	-	nC
$Q_{gs}$	Gate-Source Charge		-	2	-	
$Q_{gd}$	Gate-Drain Charge		-	3.8	-	
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-15V, R_L=3\Omega,$ $V_{GEN}=-10V, R_G=3\Omega$	-	8.3	-	nS
$t_r$	Turn-on Rise Time		-	5	-	
$t_{d(off)}$	Turn-off Delay Time		-	29	-	
$t_f$	Turn-off Fall Time		-	14	-	
<b>• Drain-Source Diode Characteristics</b>						
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V

Note:

b: Pulse width limited by maximum junction temperature.

c: Guaranteed by design, not subject to production testing.

## Characteristics Curve(N-Channel)



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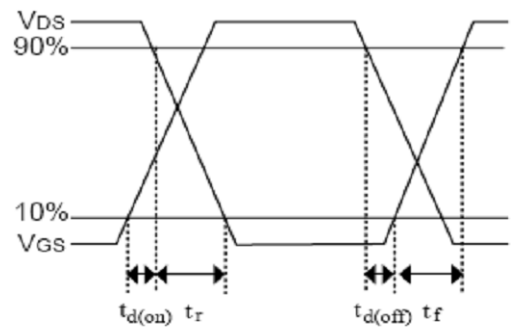
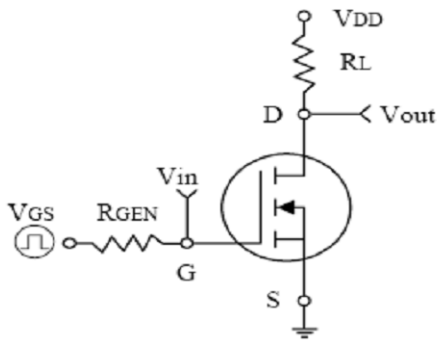
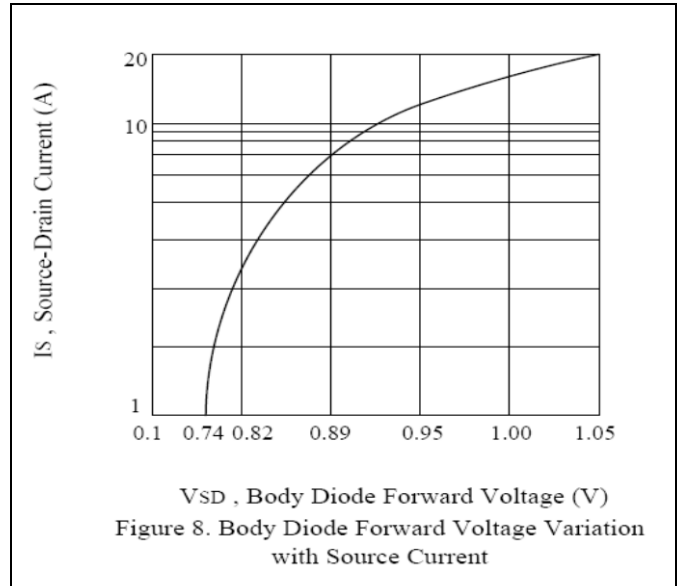
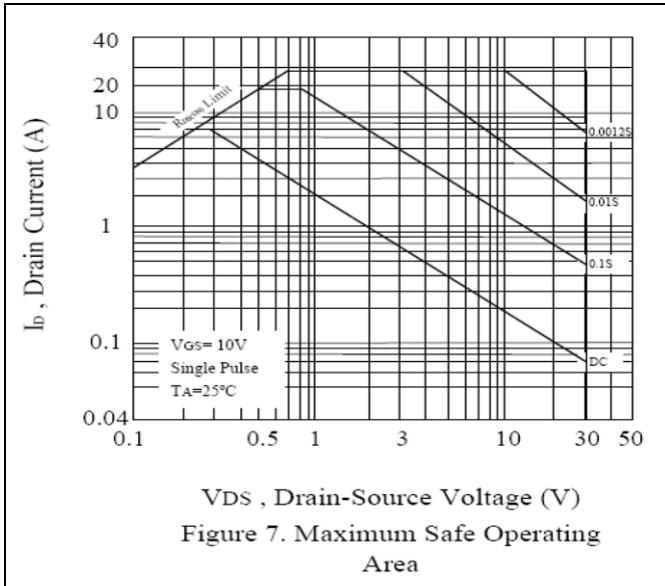


Figure 9. Switching Test Circuit and Switching Waveforms

## Characteristics Curve(P-Channel)

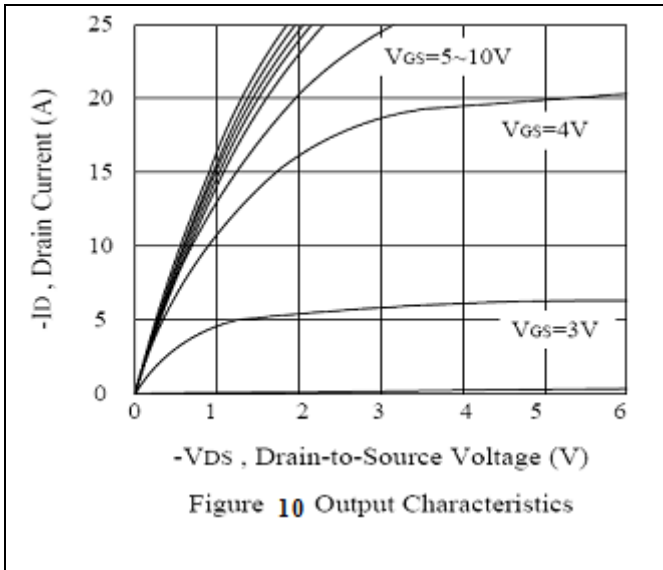


Figure 10 Output Characteristics

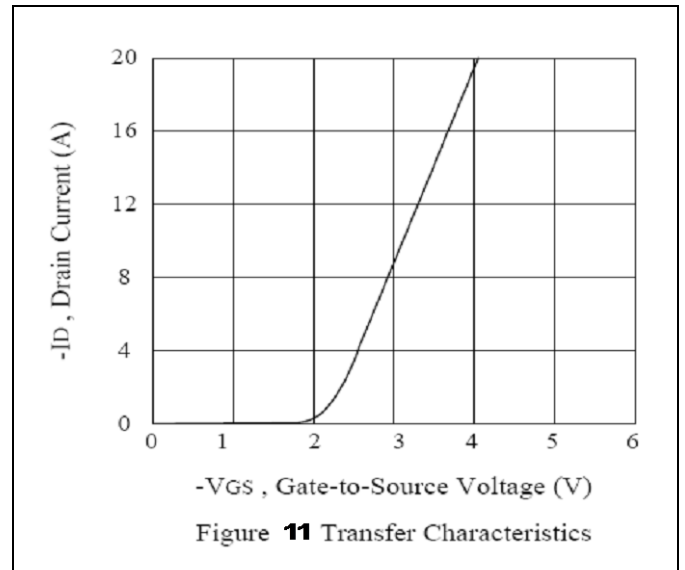


Figure 11 Transfer Characteristics

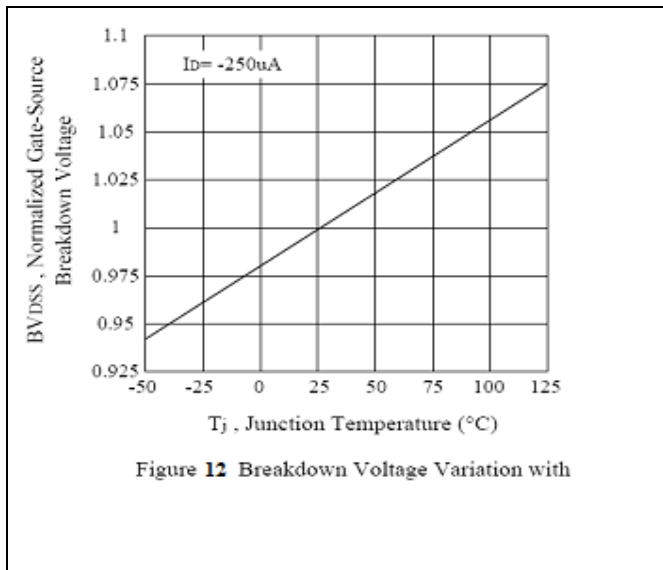


Figure 12 Breakdown Voltage Variation with

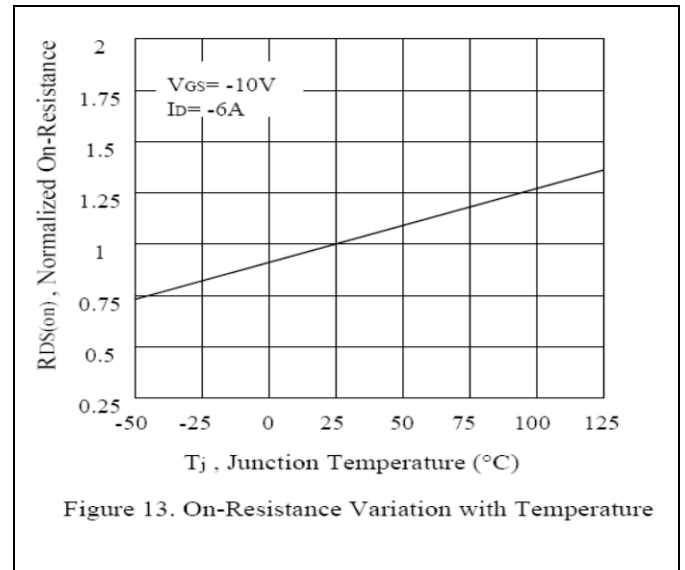


Figure 13. On-Resistance Variation with Temperature

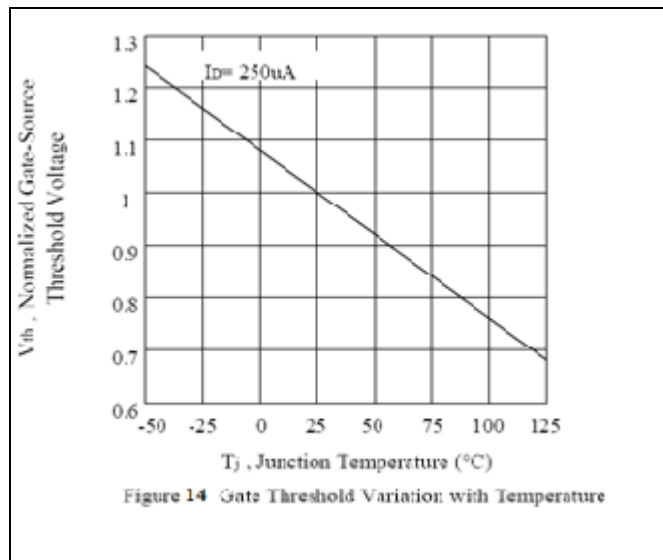


Figure 14 Gate Threshold Variation with Temperature

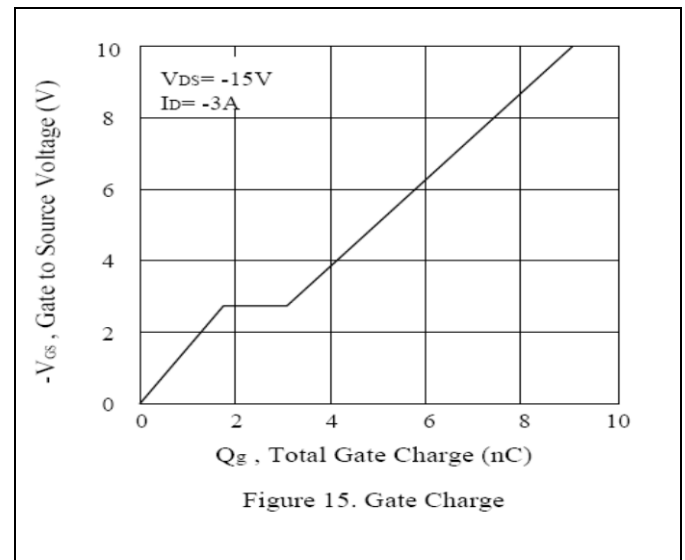


Figure 15. Gate Charge

## Characteristics Curve(P-Channel)

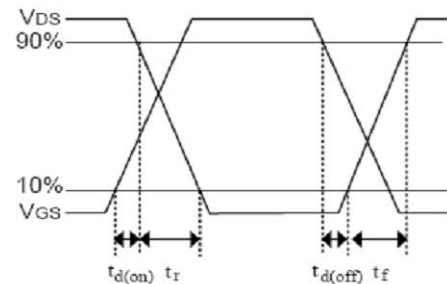
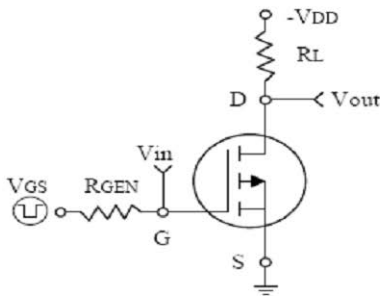
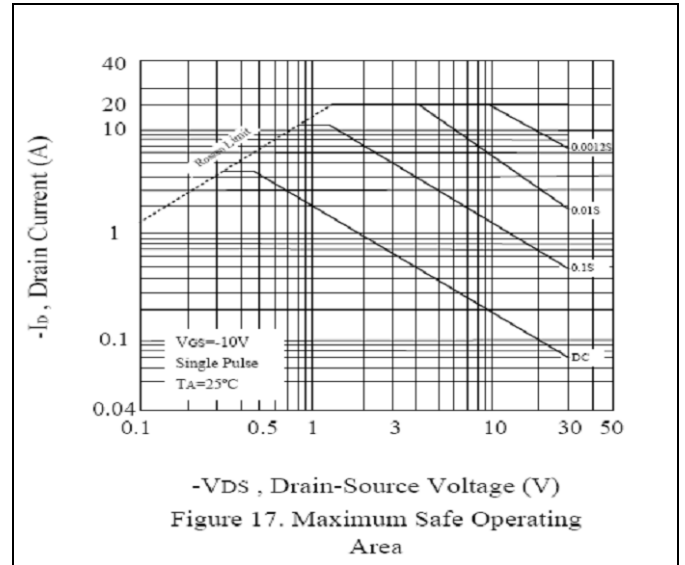
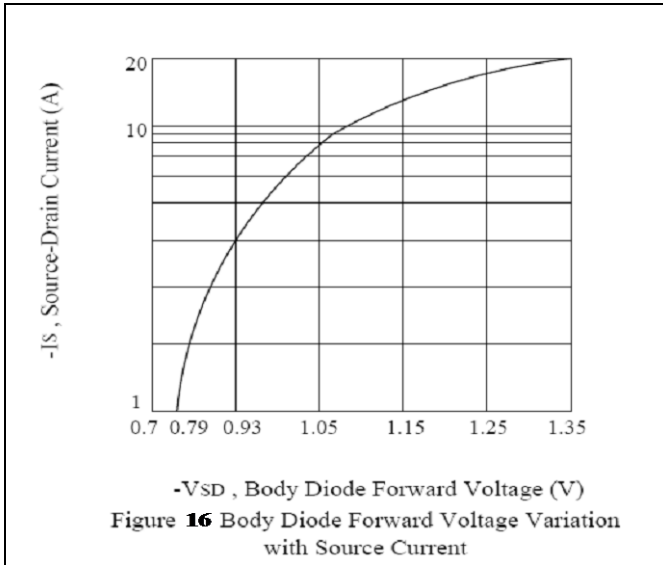
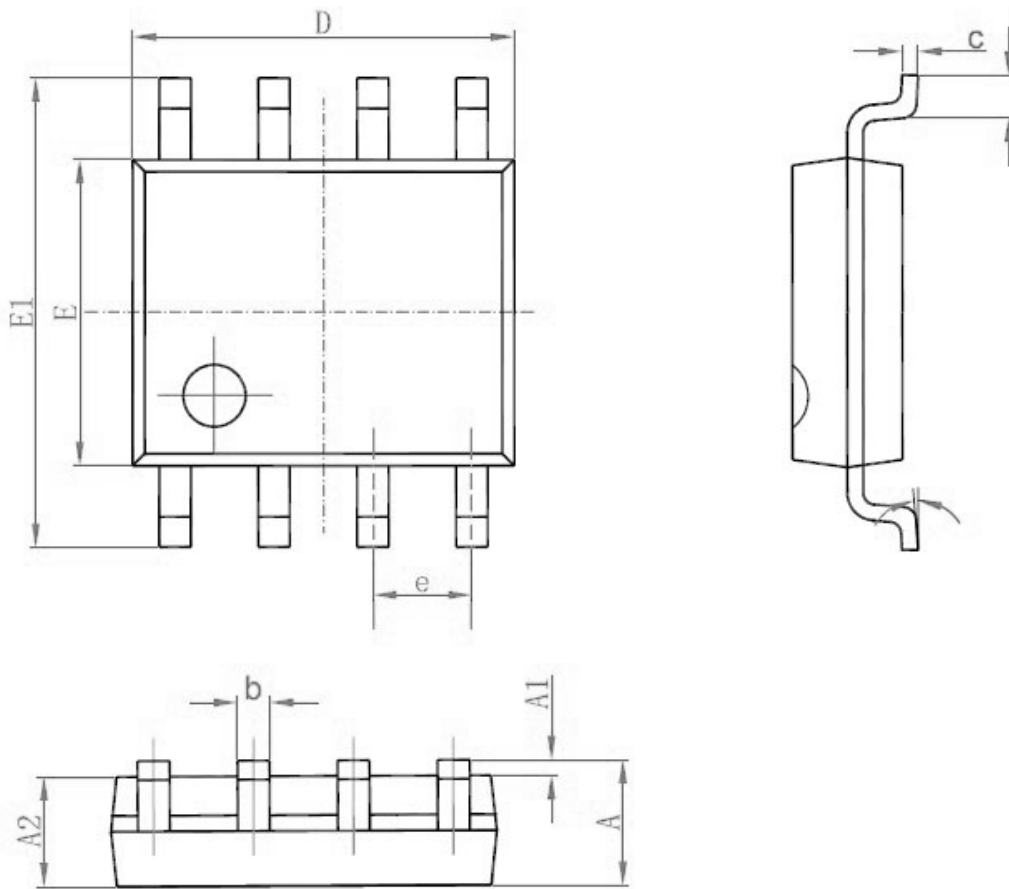


Figure 18 Switching Test Circuit and Switching Waveforms

### SOP-8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
<b>A</b>	1.350	1.750	0.053	0.069
<b>A1</b>	0.100	0.250	0.004	0.010
<b>A2</b>	1.350	1.550	0.053	0.061
<b>b</b>	0.330	0.510	0.013	0.020
<b>c</b>	0.170	0.250	0.006	0.010
<b>D</b>	4.700	5.100	0.185	0.200
<b>E</b>	3.800	4.000	0.150	0.157
<b>E1</b>	5.800	6.200	0.228	0.244
<b>e</b>	1.270(BSC)		0.050(BSC)	
<b>L</b>	0.400	1.270	0.016	0.050
<b>θ</b>	0°	8°	0°	8°





Notice

1. Specification of the products displayed herein is subject to change without notice. Continuous development may necessitate changes in technical data without notice. GEMMICRO or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies.
2. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.