

# GSM4516

## 30V N & P Pair Enhancement Mode MOSFET

### Product Description

GSM4516, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent  $R_{DS(ON)}$ , low gate charge.

These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

### Features

N-Channel

- 30V/8A,  $R_{DS(ON)}=15m\Omega@V_{GS}=10V$
- 30V/6A,  $R_{DS(ON)}=20m\Omega@V_{GS}=4.5V$

P-Channel

- -30V/-8A,  $R_{DS(ON)}=28m\Omega@V_{GS}=-10V$
- -30V/-6A,  $R_{DS(ON)}=37m\Omega@V_{GS}=-4.5V$

### Applications

- Low Current DC/DC Conversion
- Load Switch
- CCFL Inverter
- Power Management in Notebook Computer

### Packages & Pin Assignments

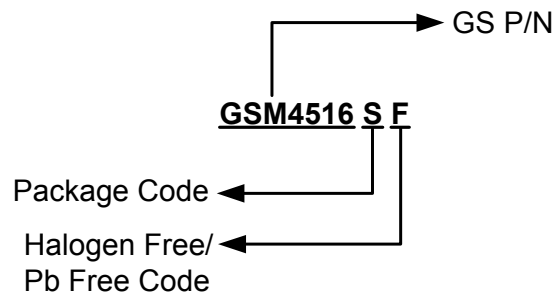
**GSM4516SF(SOP-8P)**

Pin	Description	Pin	Description
1	Source1	5	Drain2
2	Gate1	6	Drain2
3	Source2	7	Drain1
4	Gate2	8	Drain1

N-Channel MOSFET

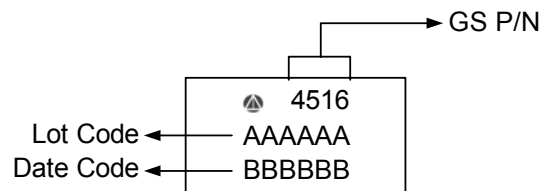
P-Channel MOSFET

## Ordering Information



Part Number	Package	Quantity Reel
GSM4516SF	SOP-8	3000 PCS

## Marking Information



## Absolute Maximum Ratings (N-Channel)

( $T_A=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Typical	Unit
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate -Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current( $T_J=150^\circ\text{C}$ )	$T_A=25^\circ\text{C}$	8.0
		$T_A=70^\circ\text{C}$	6.0
$I_{DM}$	Pulsed Drain Current	25	A
$I_S$	Continuous Source Current(Diode Conduction)	1.5	A
$P_D$	Power Dissipation	$T_A=25^\circ\text{C}$	2.8
		$T_A=70^\circ\text{C}$	1.8
$T_J$	Operating Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55/150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$

## Electrical Characteristics (N-Channel)

(T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.5		1.8	
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =85°C			10	
I <sub>D(on)</sub>	On-State Drain Current	V <sub>DS</sub> ≥5V, V <sub>GS</sub> =10V	15			A
R <sub>DS(on)</sub>	Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8A		11	15	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		15	20	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =10A		24		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =3.0A, V <sub>GS</sub> =0V		0.8	1.3	V
<b>Dynamic</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz		800		pF
C <sub>oss</sub>	Output Capacitance			180		
C <sub>rss</sub>	Reverse Transfer Capacitance			70		
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		8	12	nC
Q <sub>gs</sub>	Gate-Source Charge			2.0		
Q <sub>gd</sub>	Gate-Drain Charge			2.3		
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =15V, R <sub>L</sub> =1.5Ω, I <sub>D</sub> =10A, V <sub>GEN</sub> =10V, R <sub>G</sub> =1Ω		8	15	ns
T <sub>r</sub>				8	15	
t <sub>d(off)</sub>	Turn-Off Time			16	28	
T <sub>f</sub>				8	16	

## Absolute Maximum Ratings (P-Channel)

(T<sub>A</sub>=25°C unless otherwise noted)

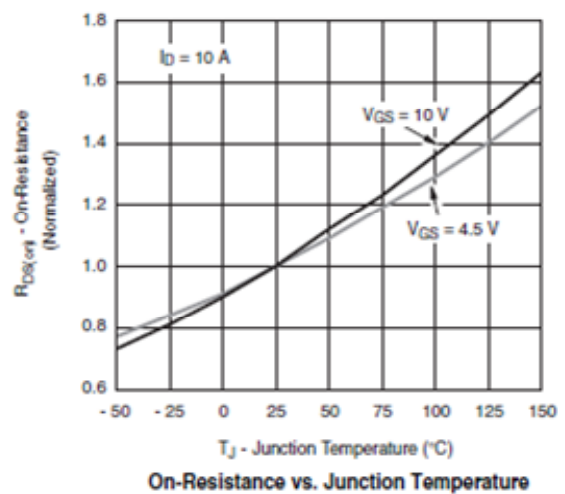
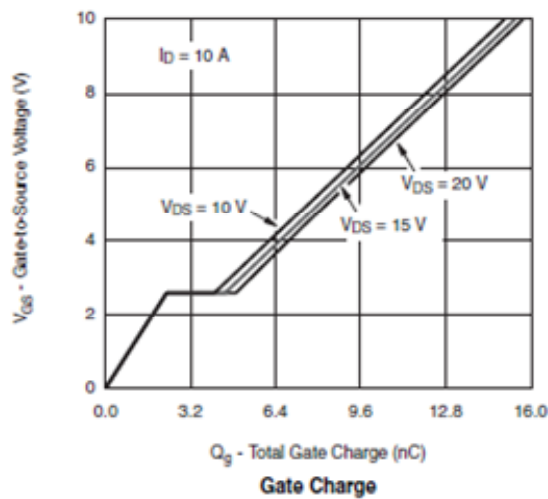
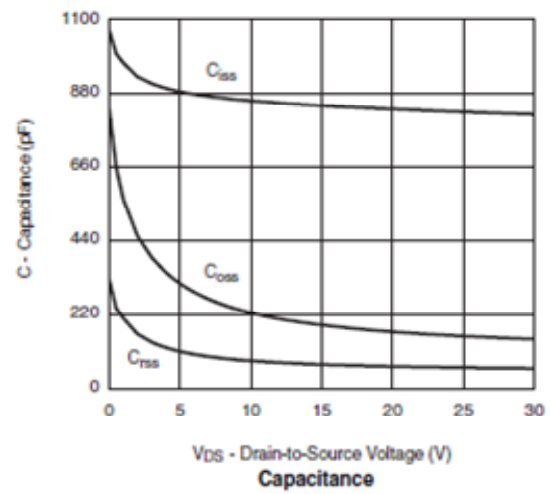
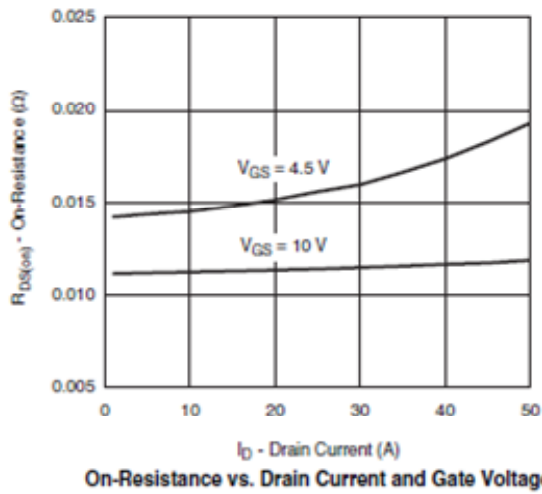
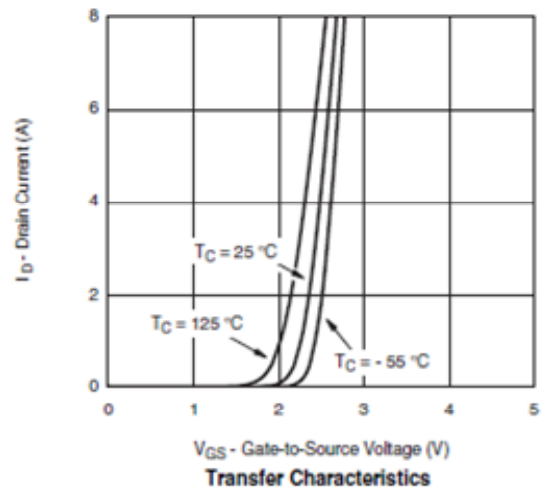
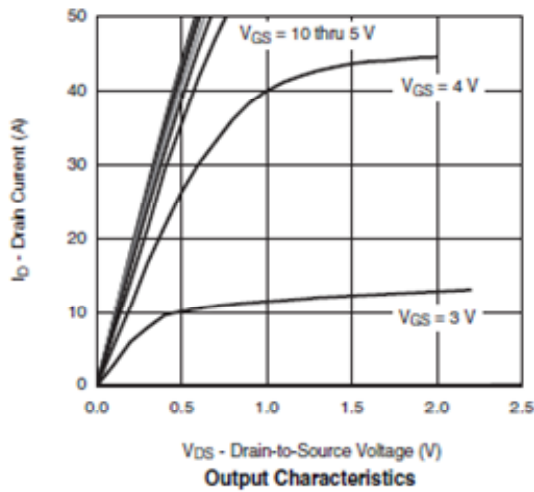
Symbol	Parameter	Typical	Unit
V <sub>DSS</sub>	Drain-Source Voltage	-30	V
V <sub>GSS</sub>	Gate -Source Voltage	±20	V
I <sub>D</sub>	Continuous Drain Current(T <sub>J</sub> =150°C)	T <sub>A</sub> =25°C	-8.0
		T <sub>A</sub> =70°C	-6.0
I <sub>DM</sub>	Pulsed Drain Current	-25	A
I <sub>S</sub>	Continuous Source Current(Diode Conduction)	-1.7	A
P <sub>D</sub>	Power Dissipation	T <sub>A</sub> =25°C	2.8
		T <sub>A</sub> =70°C	1.8
T <sub>J</sub>	Operating Junction Temperature	150	°C
T <sub>STG</sub>	Storage Temperature Range	-55/150	°C
R <sub>θJA</sub>	Thermal Resistance-Junction to Ambient	62.5	°C/ W

## Electrical Characteristics (P-Channel)

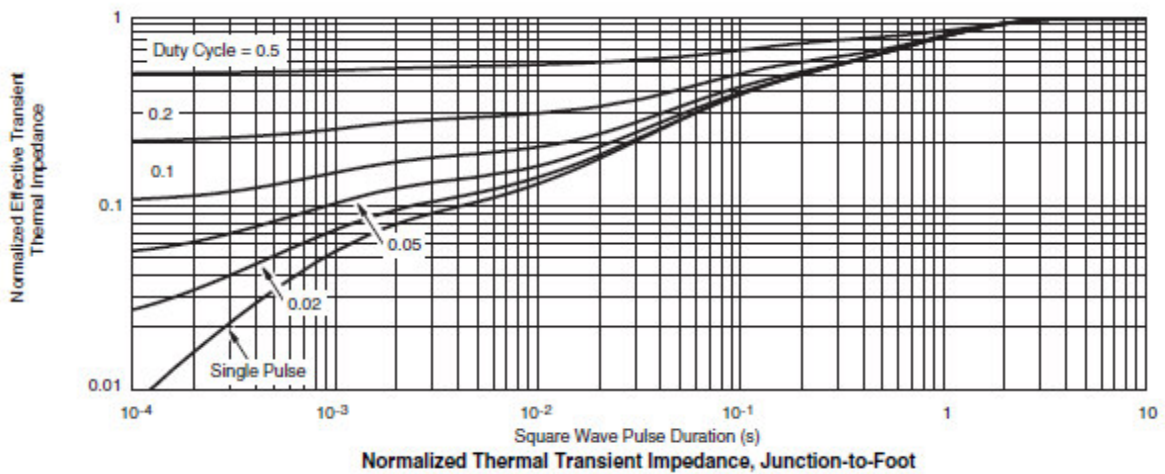
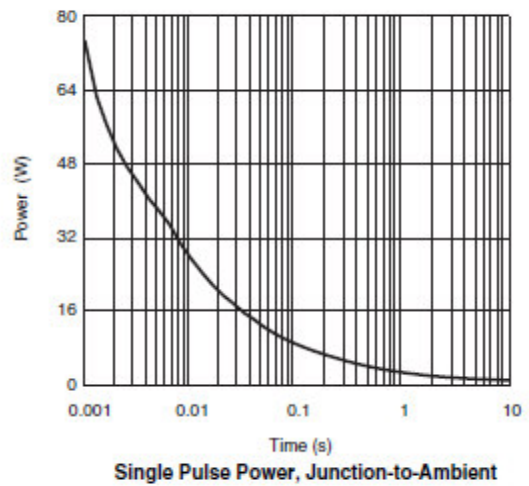
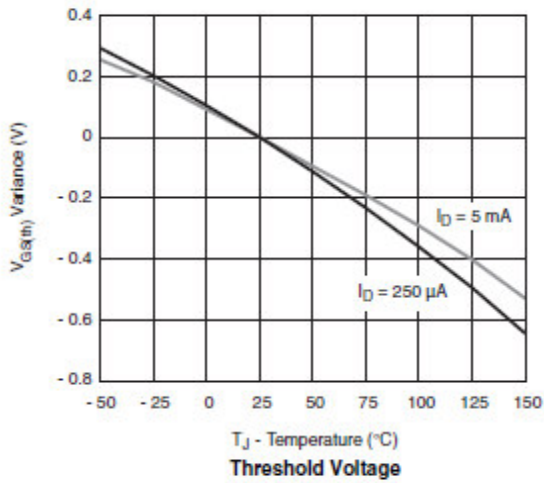
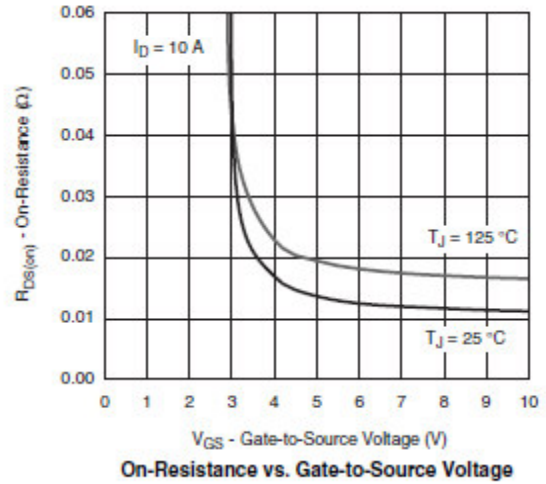
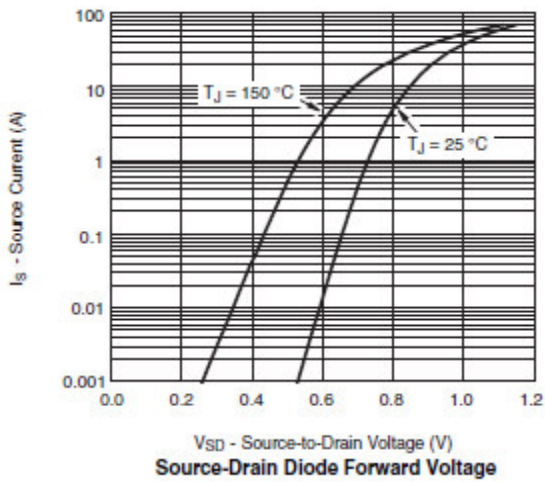
( $T_A=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5		-1.8	
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24V, V_{GS}=0V$			-1	uA
		$V_{DS}=-24V, V_{GS}=0V, T_J=85^\circ\text{C}$			-30	
$I_{D(on)}$	On-State Drain Current	$V_{DS}\leq -10V, V_{GS}=-10V$	-30			A
		$V_{DS}\leq -5V, V_{GS}=-4.5V$	-5			
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-8A$		24	28	m $\Omega$
		$V_{GS}=-4.5V, I_D=-6A$		30	37	
$g_{FS}$	Forward Transconductance	$V_{DS}=-10V, I_D=-9.0A$		22		S
$V_{SD}$	Diode Forward Voltage	$I_S=-1.7A, V_{GS}=0V$		-0.7	-1.3	V
<b>Dynamic</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$		950		pF
$C_{oss}$	Output Capacitance			200		
$C_{riss}$	Reverse Transfer Capacitance			175		
$Q_g$	Total Gate Charge	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-6.0A$		10	18	nC
$Q_{gs}$	Gate-Source Charge			1.6		
$Q_{gd}$	Gate-Drain Charge			3.0		
$t_{d(on)}$	Turn-On Time	$V_{DD}=-15V, R_L=15\Omega, I_D=-5.0A, V_{GEN}=-10V, R_G=6\Omega$		8	18	ns
$T_r$				8	18	
$t_{d(off)}$	Turn-Off Time			25	50	
$T_f$				25	35	

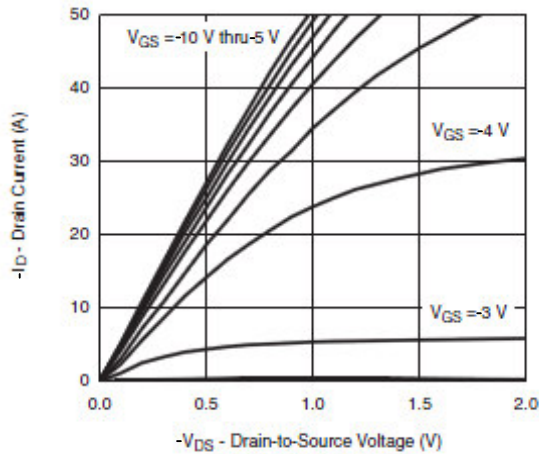
## Typical Performance Characteristics (N-Channel)



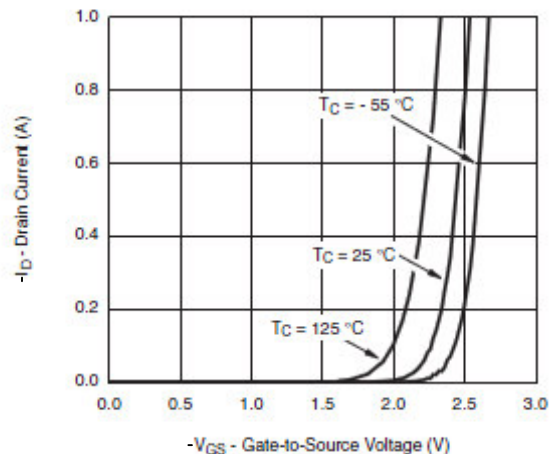
## Typical Performance Characteristics (N-Channel)



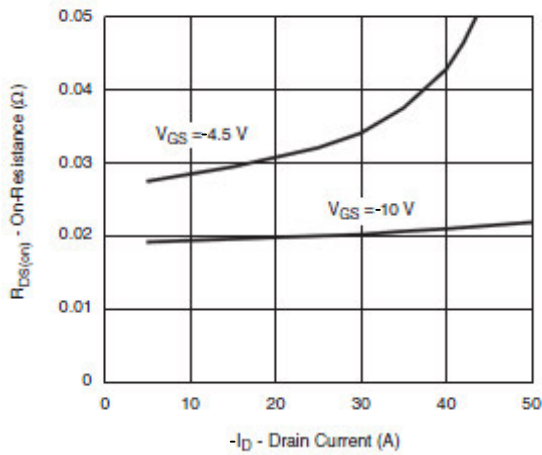
## Typical Performance Characteristics (P-Channel)



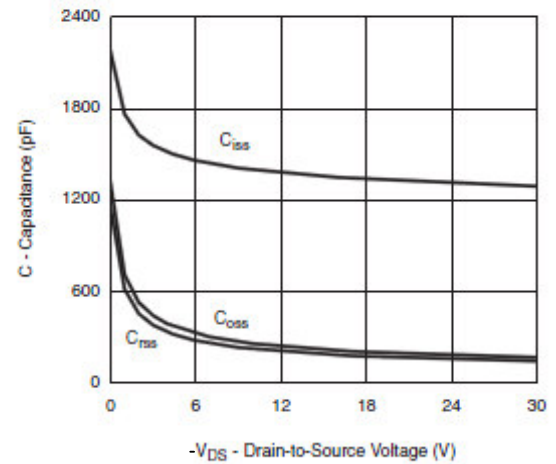
Output Characteristics



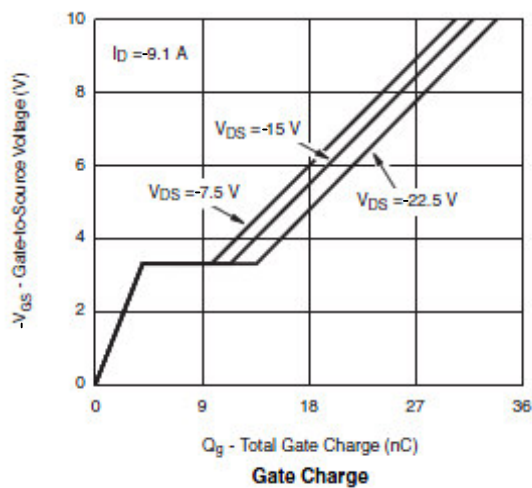
Transfer Characteristics



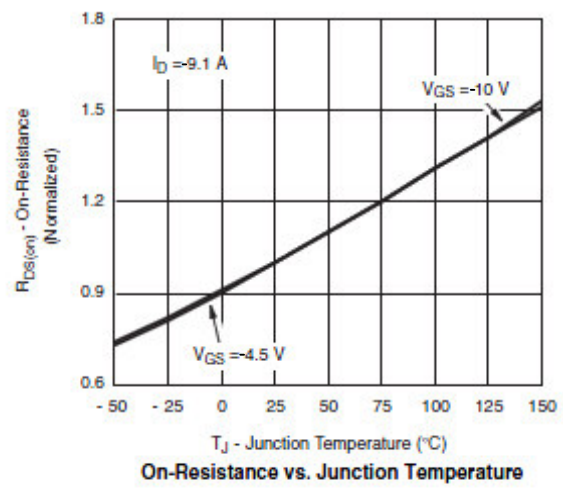
On-Resistance vs. Drain Current



Capacitance

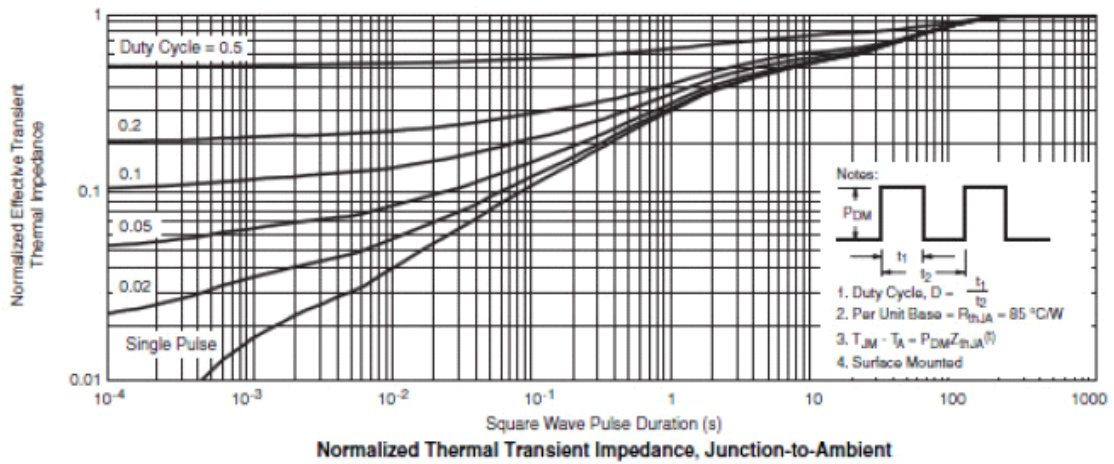
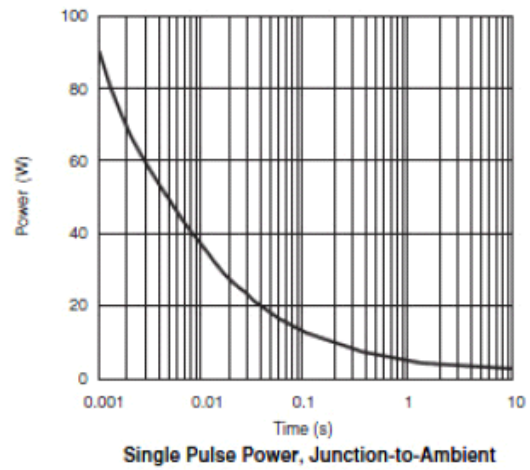
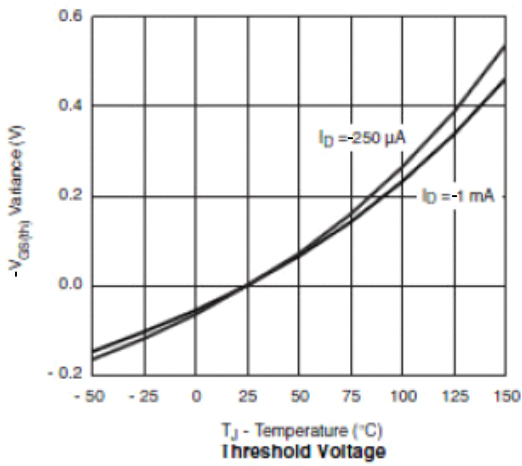
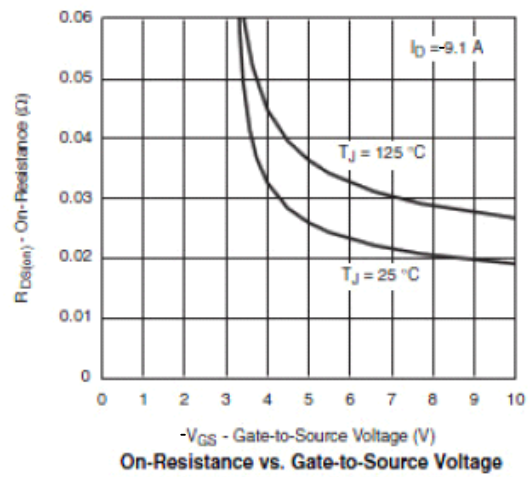
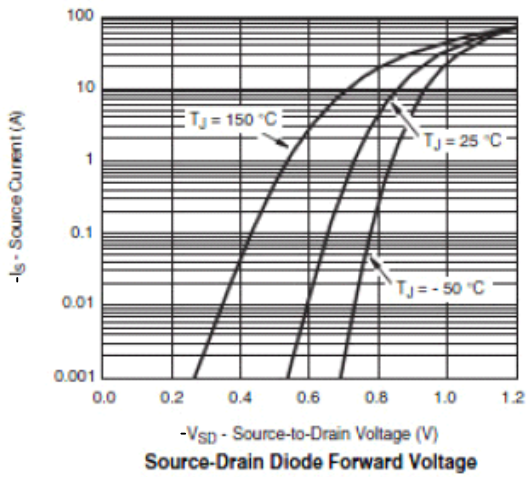


Gate Charge



On-Resistance vs. Junction Temperature

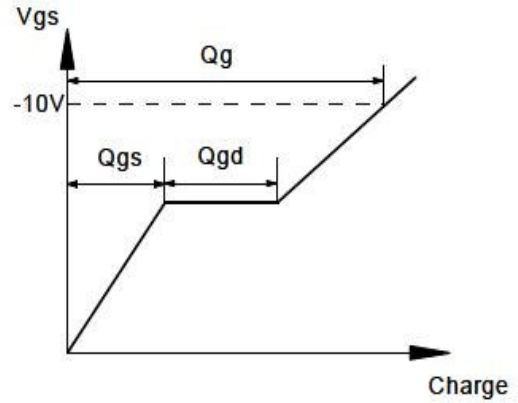
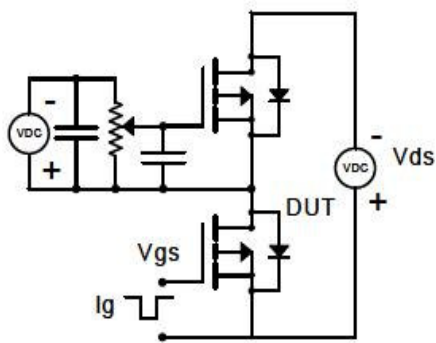
## Typical Performance Characteristics (P-Channel)



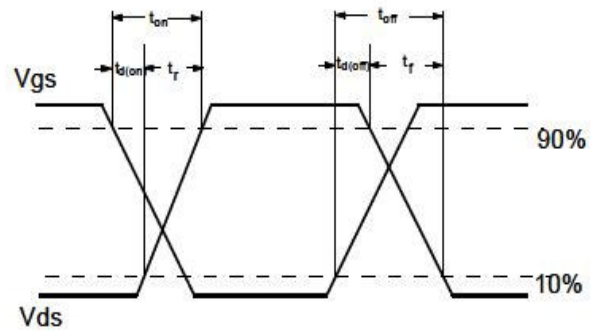
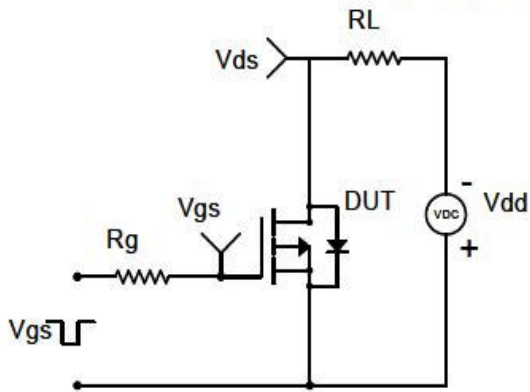


## Typical Performance Characteristics

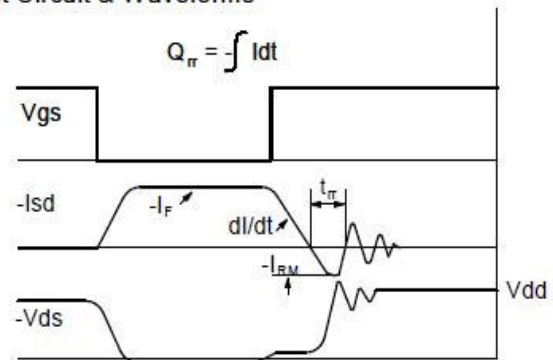
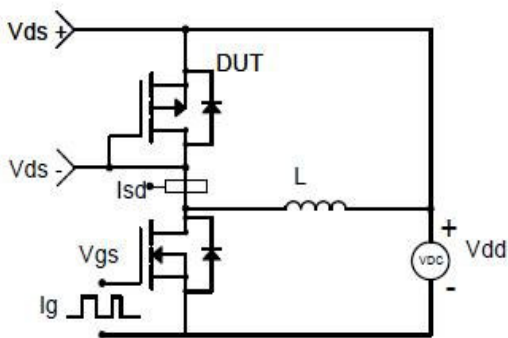
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

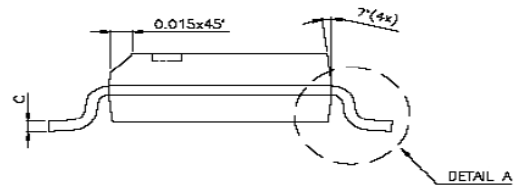
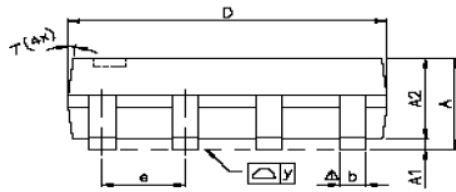
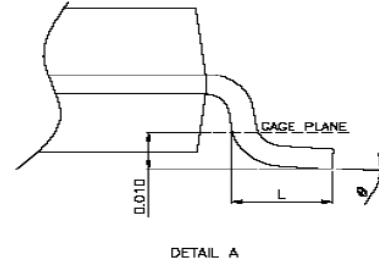
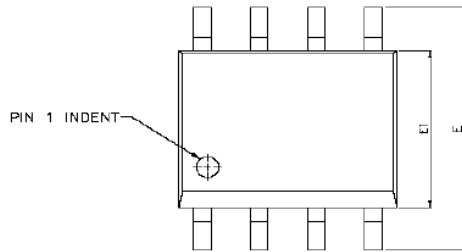


### Diode Recovery Test Circuit & Waveforms



Package Dimension

# SOP-8P PLASTIC PACKAGE







Dimensions						
SYMBOL	Millimeters			Inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	-	0.25	0.004	-	0.010
A2	-	1.45	-	-	0.057	-
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	-	1.27	-	-	0.050	-
L	0.38	0.71	1.27	0.015	0.028	0.050
$\Delta y$	-	-	0.076	-	-	0.003
$\theta$	0°	-	8°	0°	-	8°





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