

**N and P Channel Enhancement Mode Power MOSFET**

**Description**

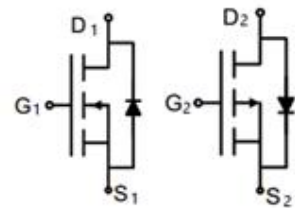
This Product uses advanced trench technology MOSFETs to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

**General Features**

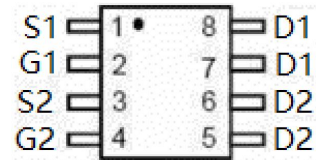
- **NMOS**
- $V_{DS}$  40V
- $I_D$  (at  $V_{GS} = 10V$ ) 8A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 20mΩ
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5V$ ) < 35mΩ
  
- **PMOS**
- $V_{DS}$  -40V
- $I_D$  (at  $V_{GS} = -10V$ ) -7A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) < 35mΩ
- $R_{DS(ON)}$  (at  $V_{GS} = -4.5V$ ) < 45mΩ
- RoHS Compliant

**Application**

- Power switch
- DC/DC converters



Schematic diagram



Marking and pin assignment



SOP-8

Device	Package	Marking	Packaging
G4616	SOP-8双基	G4616	4000pcs/Reel

**Absolute Maximum Ratings**  $T_C = 25^\circ C$ , unless otherwise noted

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	$V_{DS}$	40	-40	V
Continuous Drain Current	$I_D$	8	-7	A
Pulsed Drain Current (note1)	$I_{DM}$	40	-30	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Power Dissipation	$P_D$	2	2.8	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 To 150	-55 To 150	$^\circ C$

**Thermal Resistance**

Parameter	Symbol	NMOS	PMOS	Unit
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	45	$^\circ C/W$

NMOS 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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	--	--	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	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 8A$	--	15	20	m $\Omega$
		$V_{GS} = 4.5V, I_D = 6A$	--	20	35	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=8A$	33	--	--	S
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 20V,$ $f = 1.0\text{MHz}$	--	415	--	pF
Output Capacitance	$C_{oss}$		--	122	--	
Reverse Transfer Capacitance	$C_{rss}$		--	11	--	
Total Gate Charge	$Q_g$	$V_{DS} = 20V,$ $I_D = 8A,$ $V_{GS} = 10V$	--	12	--	nC
Gate-Source Charge	$Q_{gs}$		--	3.2	--	
Gate-Drain Charge	$Q_{gd}$		--	3.1	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 20V,$ $I_D = 8A,$ $R_G = 3\Omega$	--	4	--	ns
Turn-on Rise Time	$t_r$		--	3	--	
Turn-off Delay Time	$t_{d(off)}$		--	15	--	
Turn-off Fall Time	$t_f$		--	2	--	
<b>Drain-Source Body Diode Characteristics</b>						
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 1A, V_{GS} = 0V$	--	0.8	1.2	V

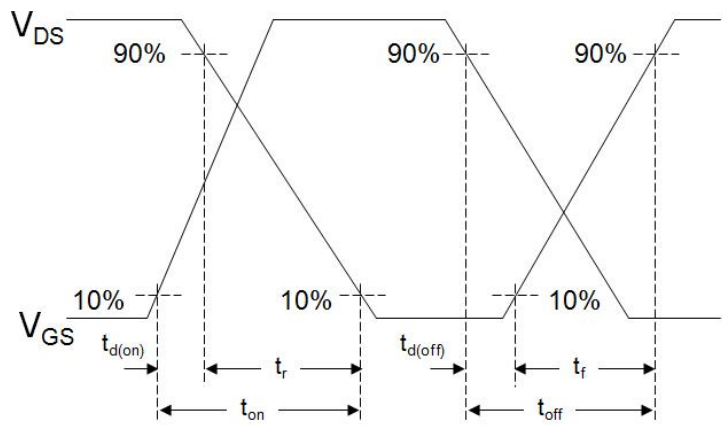
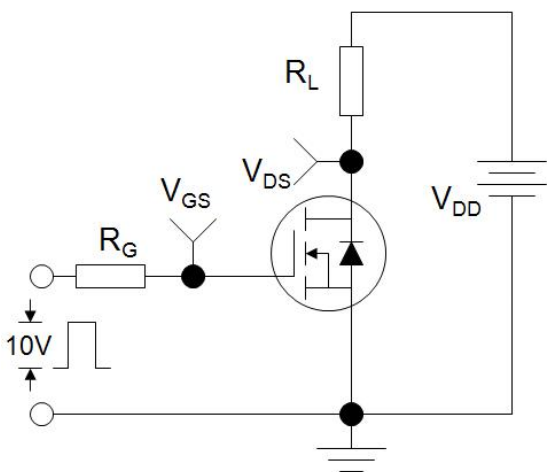
**Notes**

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

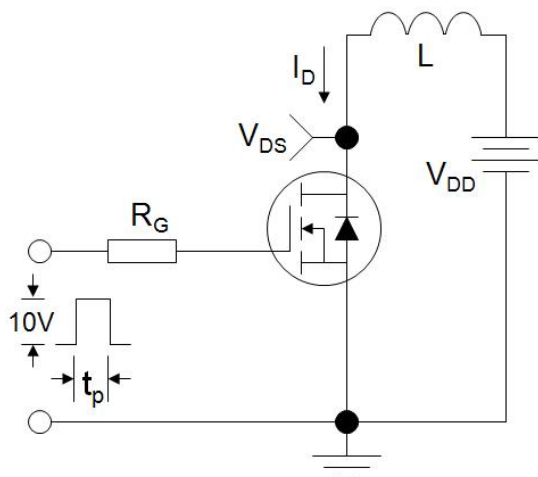
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

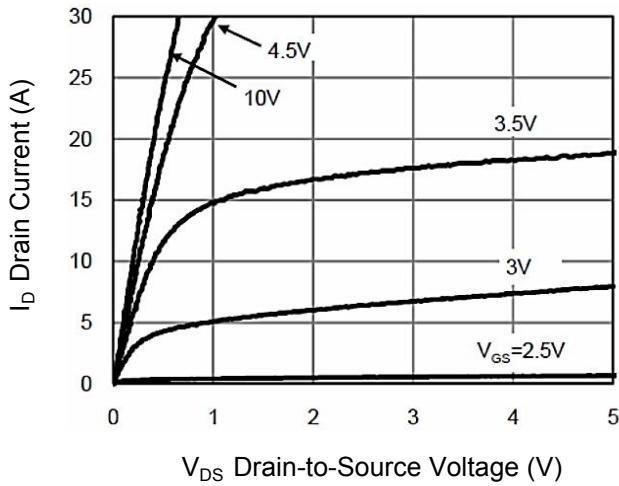


Figure 2. Transfer Characteristics

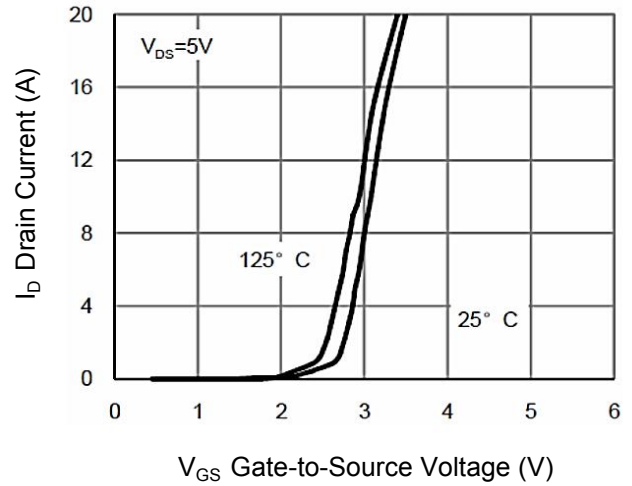


Figure 3. Drain-Source On-Resistance

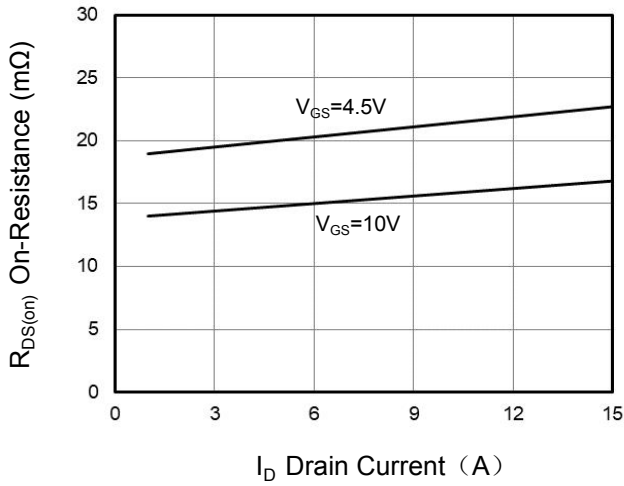


Figure 4. Gate Charge

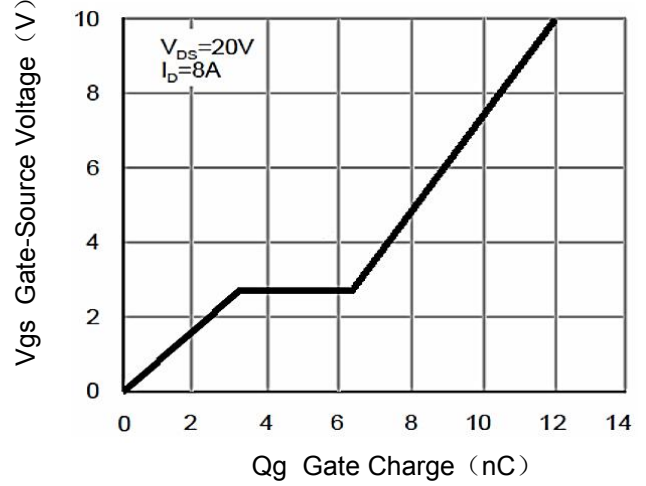


Figure 5. Capacitance

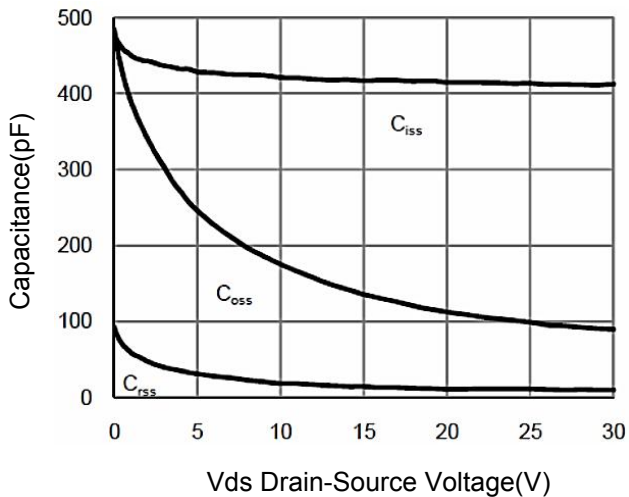
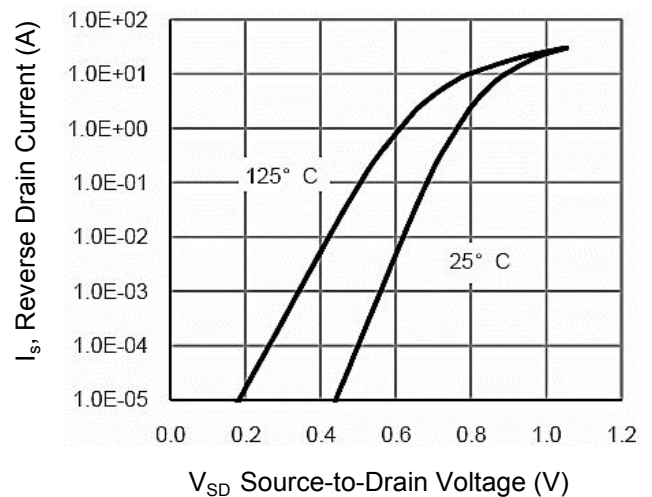
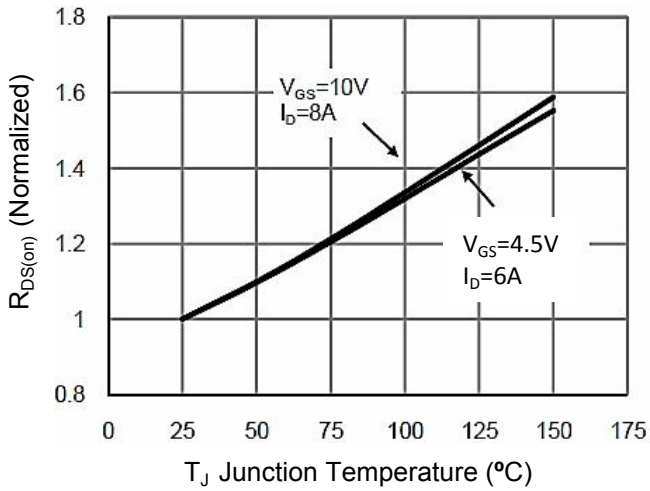


Figure 6. Source-Drain Diode Forward

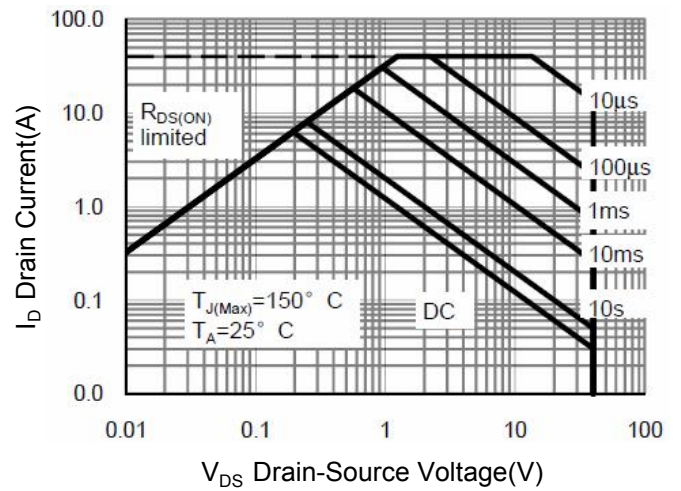


**NMOS Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

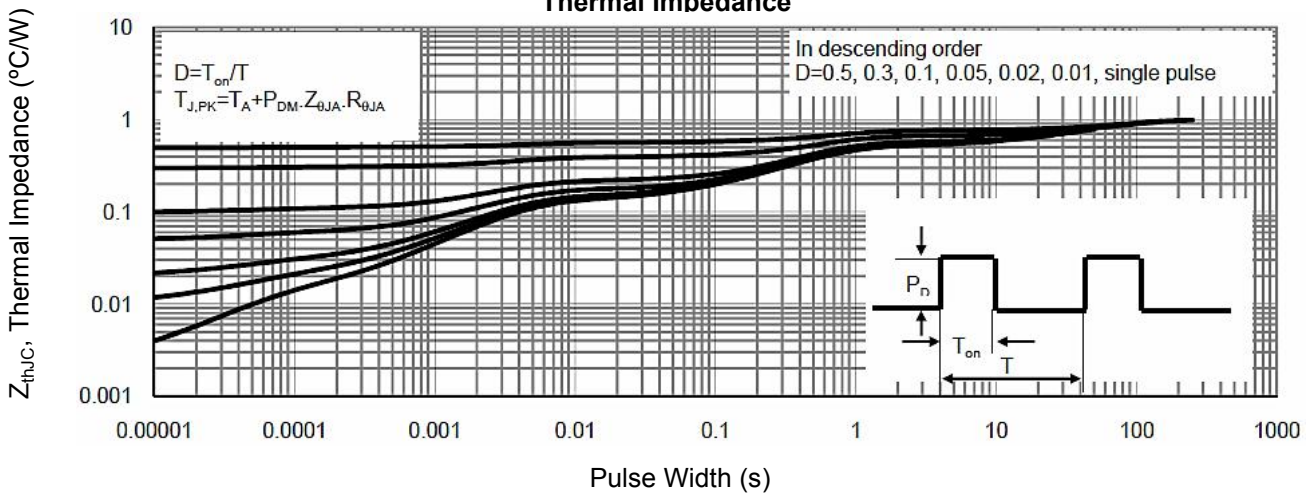
**Figure 7. Drain-Source On-Resistance**



**Figure 8. Safe Operation Area**



**Figure 9. Normalized Maximum Transient Thermal Impedance**

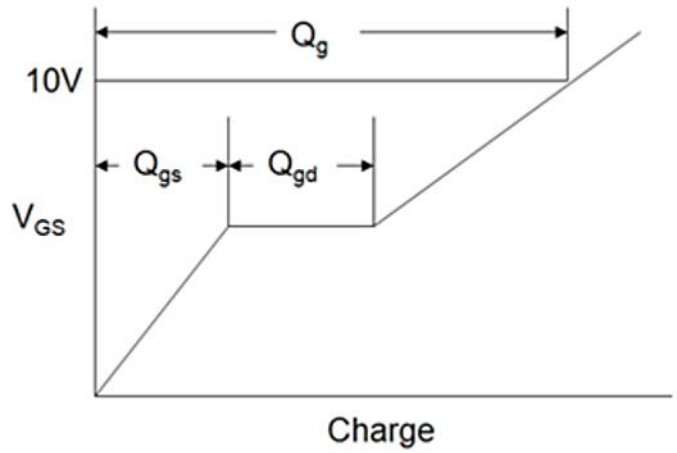
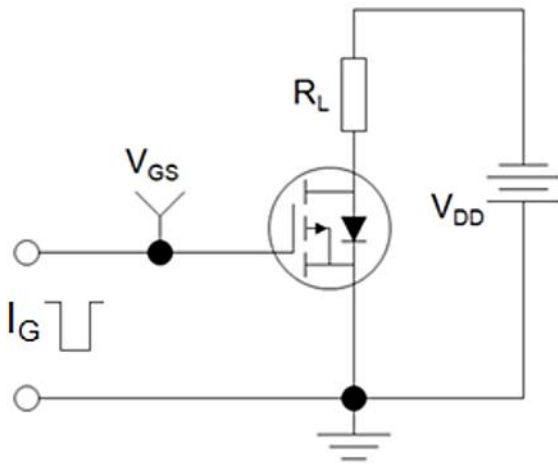


PMOS Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -40V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	-1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.5	-2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -7A$	--	28	35	m $\Omega$
		$V_{GS} = -4.5V, I_D = -3.5A$	--	36	45	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -7A$	--	20	--	S
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = -20V,$ $f = 1.0\text{MHz}$	--	520	--	pF
Output Capacitance	$C_{oss}$		--	100	--	
Reverse Transfer Capacitance	$C_{rss}$		--	65	--	
Total Gate Charge	$Q_g$	$V_{DD} = -20V,$ $I_D = -5A,$ $V_{GS} = -10V$	--	13	--	nC
Gate-Source Charge	$Q_{gs}$		--	3.8	--	
Gate-Drain Charge	$Q_{gd}$		--	3.1	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -20V,$ $I_D = -5A,$ $R_G = 6\Omega$	--	7.5	--	ns
Turn-on Rise Time	$t_r$		--	5.5	--	
Turn-off Delay Time	$t_{d(off)}$		--	19	--	
Turn-off Fall Time	$t_f$		--	7	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	-7	A
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = -1A, V_{GS} = 0V$	--	--	-1.2	V

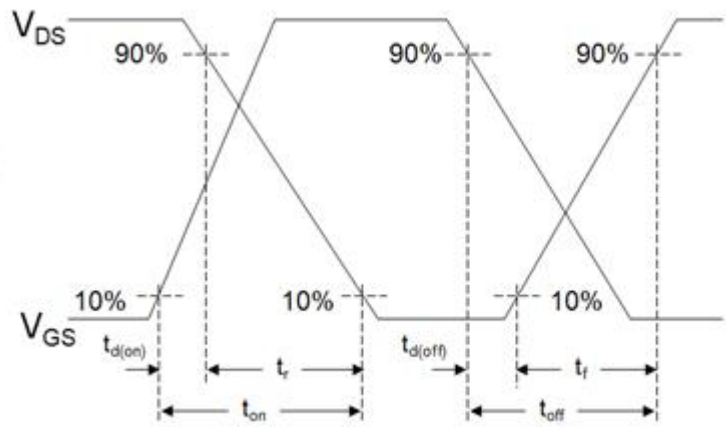
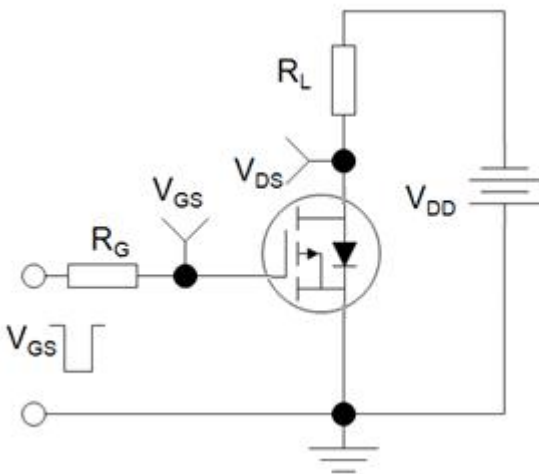
**Notes**

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

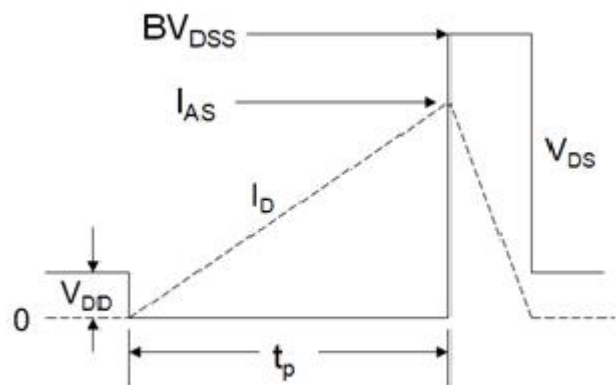
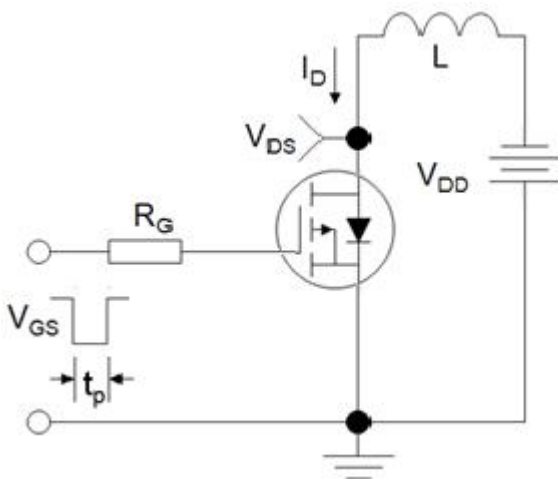
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

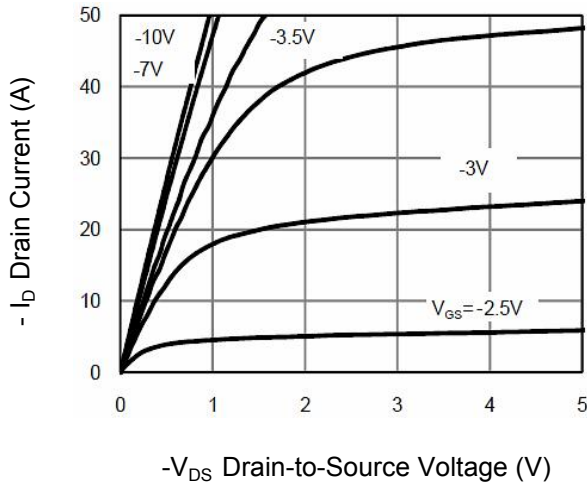


Figure 2. Transfer Characteristics

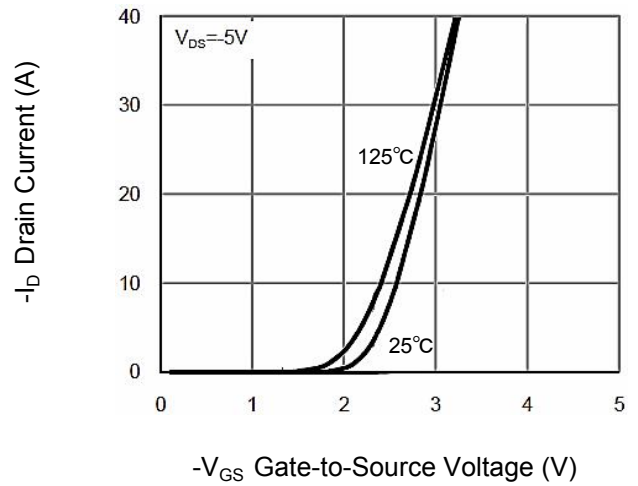


Figure 3.  $R_{DS(on)}$ -Drain Current

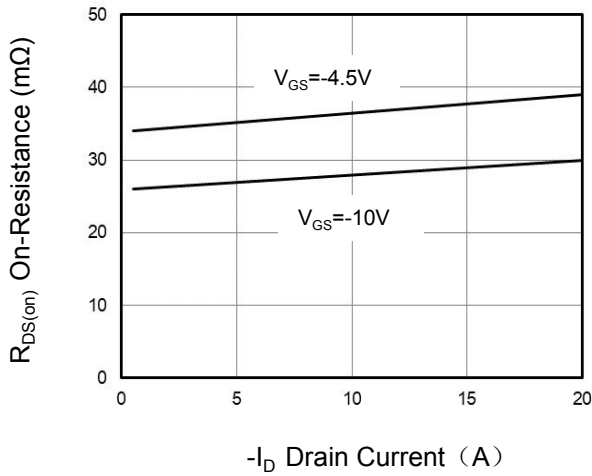


Figure 4. Gate Charge

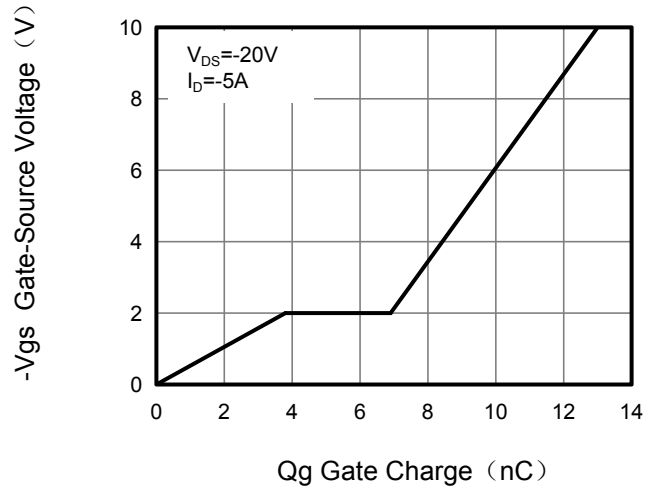


Figure 5. Capacitance

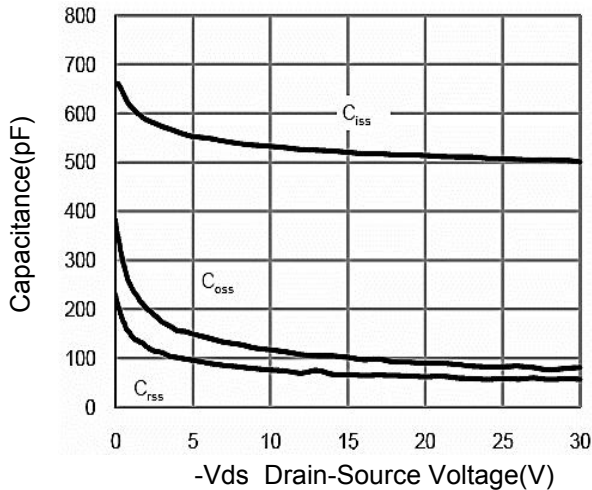
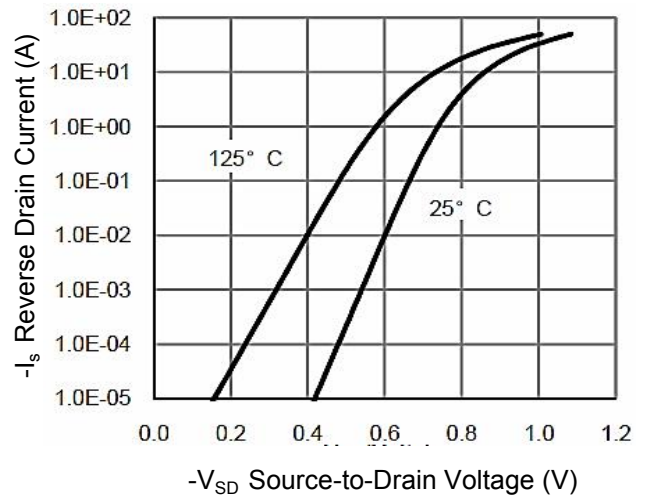


Figure 6. Source-Drain Diode Forward





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

Figure 7. Drain-Source On-Resistance

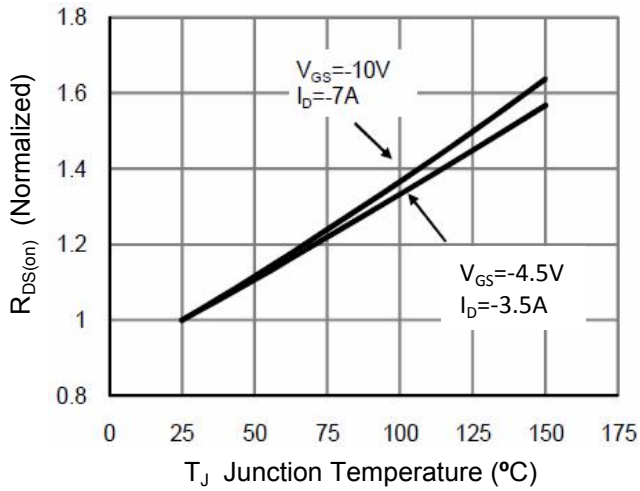


Figure 8. Safe Operation Area

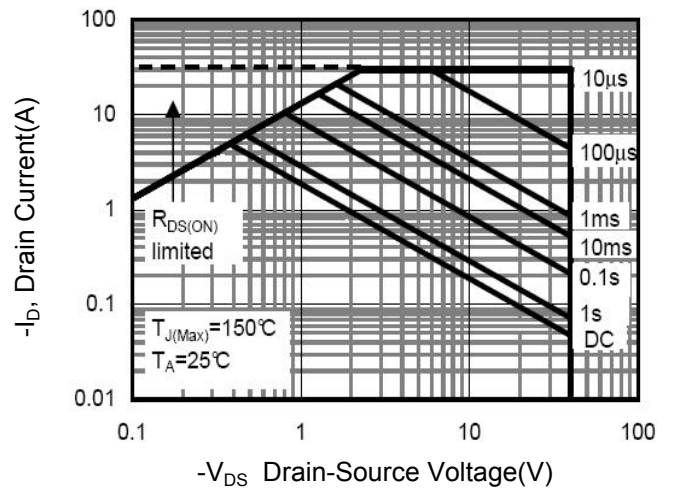
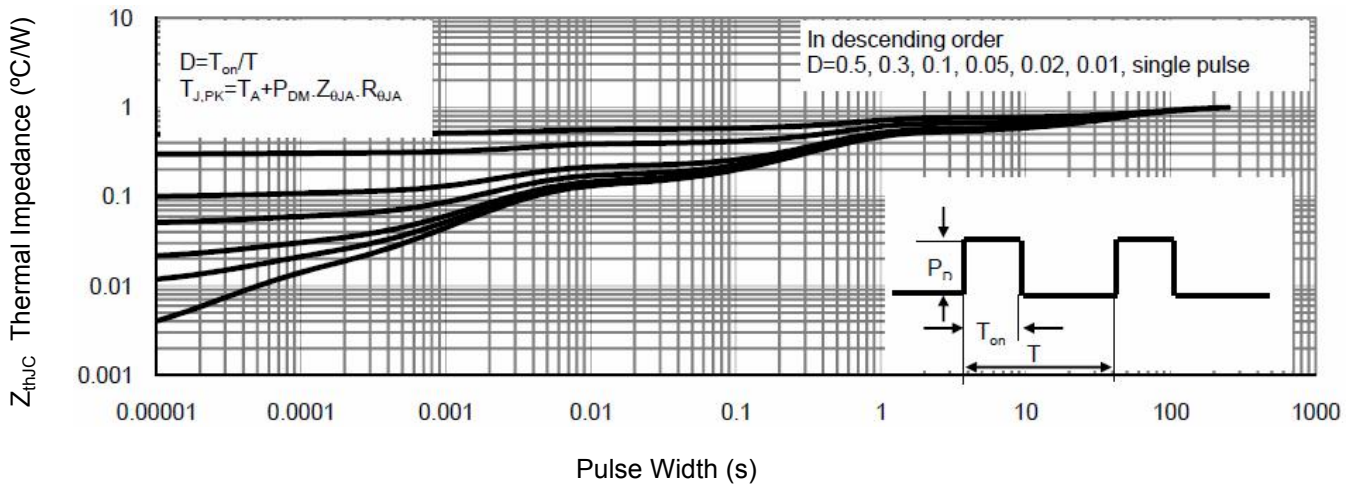
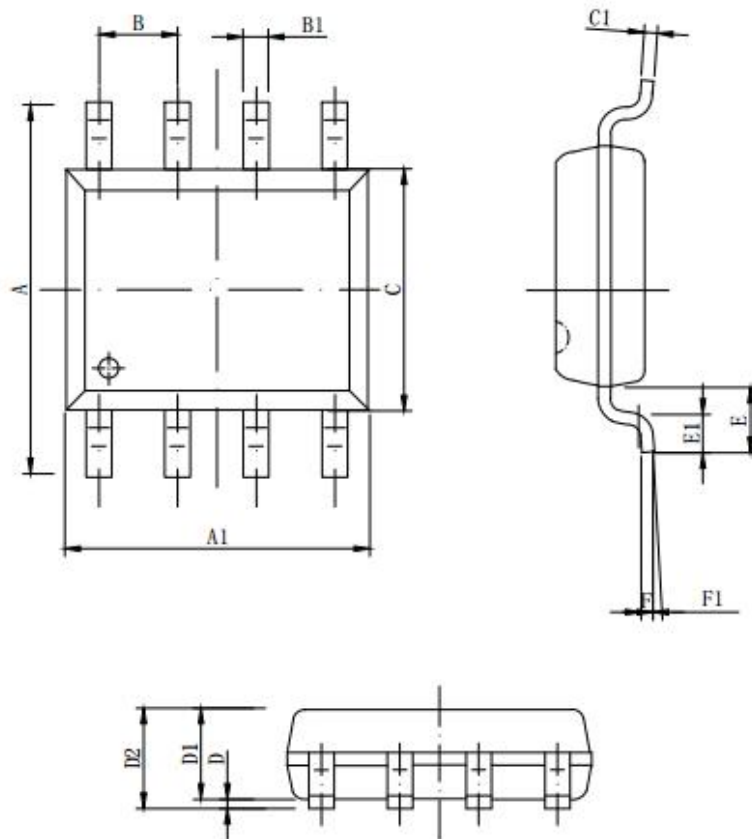


Figure 9. Normalized Maximum Transient Thermal Impedance



SOP-8 Package Information



Symbol	Dimensions in Millimeters		
	MIN.	NOM.	MAX.
A	5.800	6.000	6.200
A1	4.800	4.900	5.000
B	1.270BSC		
B1	0.35 <sup>8x</sup>	0.40 <sup>8x</sup>	0.45 <sup>8x</sup>
C	3.780	3.880	3.980
C1	--	0.203	0.253
D	0.050	0.150	0.250
D1	1.350	1.450	1.550
D2	1.500	1.600	1.700
D2	1.500	1.600	1.700
E	1.060REF		
E1	0.400	0.700	0.100
F	0.250BSC		
F1	2°	4°	6°

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