

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**

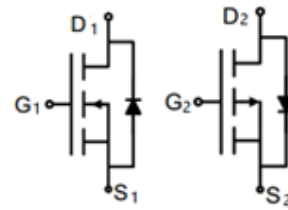
- V_{DS} 40V
- I_D (at $V_{GS} = 10V$) 4.5A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 41m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 4.5V$) < 68m Ω

- **PMOS**

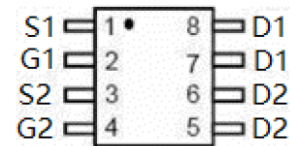
- V_{DS} -40V
- I_D (at $V_{GS} = -10V$) -10A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 37m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 54m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

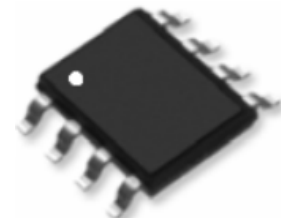
- Power switch
- DC/DC converters



Schematic diagram



Marking and pin assignment



SOP-8

Device	Package	Marking	Packaging
G05NP04S	SOP-8双基	G05NP04	4000pcs/Reel

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

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	V_{DS}	40	-40	V
Continuous Drain Current	I_D	4.5	-10	A
Pulsed Drain Current (note1)	I_{DM}	18	-40	A
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Power Dissipation	P_D	2	2	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	-55 To 150	$^\circ\text{C}$

Thermal Resistance

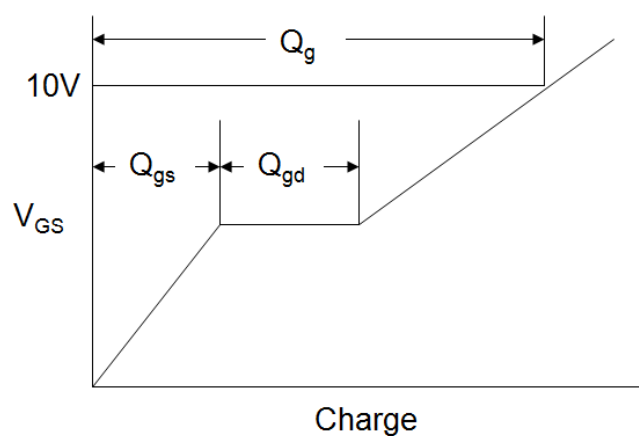
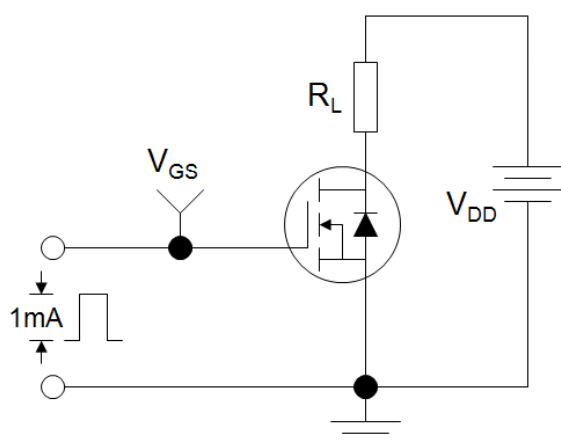
Parameter	Symbol	NMOS	PMOS	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	48	62.5	$^\circ\text{C/W}$

NMOS Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40V, V _{GS} = 0V, T _J = 25°C	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1	1.25	2.5	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 1A	--	27.5	41	mΩ
		V _{GS} = 4.5V, I _D = 1A	--	35	68	
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =6A	--	27	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 20V, f = 1.0MHz	--	516	--	pF
Output Capacitance	C _{oss}		--	82	--	
Reverse Transfer Capacitance	C _{rss}		--	43	--	
Total Gate Charge	Q _g	V _{DD} = 20V, I _D = 6A, V _{GS} = 10V	--	8.9	--	nC
Gate-Source Charge	Q _{gs}		--	2.4	--	
Gate-Drain Charge	Q _{gd}		--	1.4	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 20V, I _D = 6A, R _G = 3Ω	--	6.4	--	ns
Turn-on Rise Time	t _r		--	3.6	--	
Turn-off Delay Time	t _{d(off)}		--	16.2	--	
Turn-off Fall Time	t _f		--	6.6	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	2	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 6A, V _{GS} = 0V	--	--	1.2	V

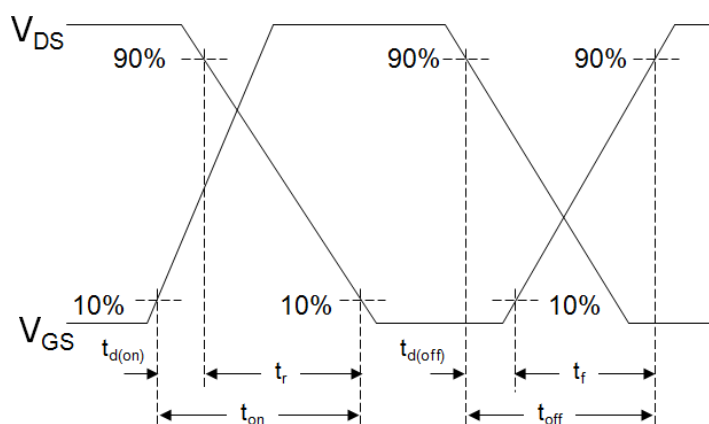
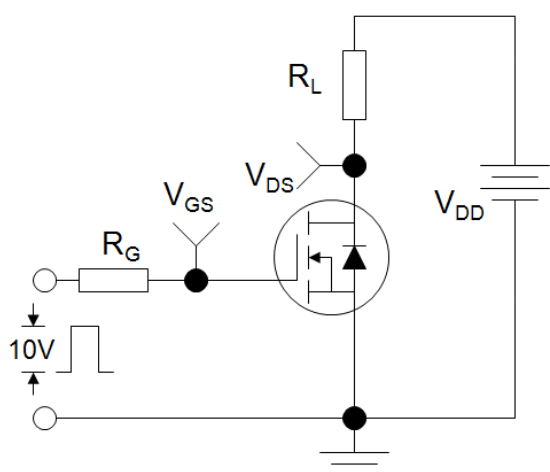
Notes

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

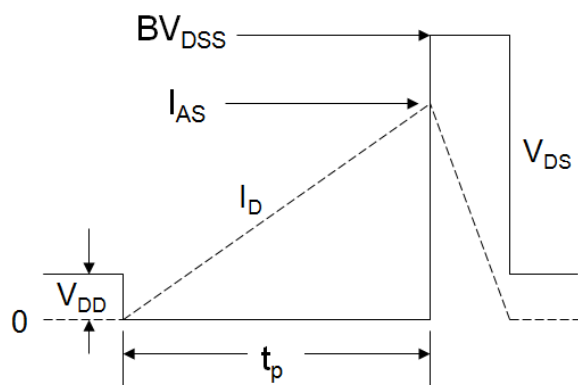
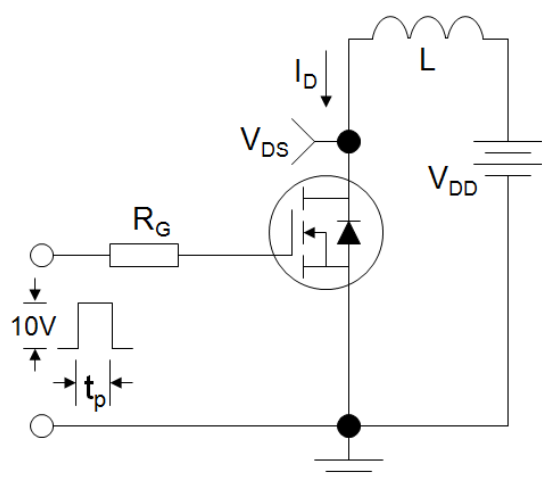
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

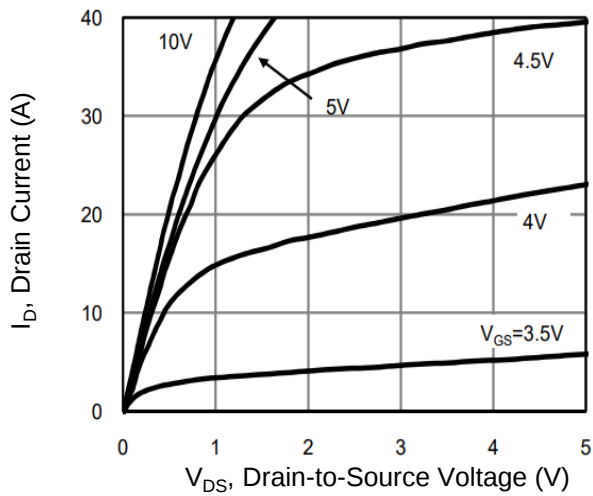


Figure 2. Transfer Characteristics

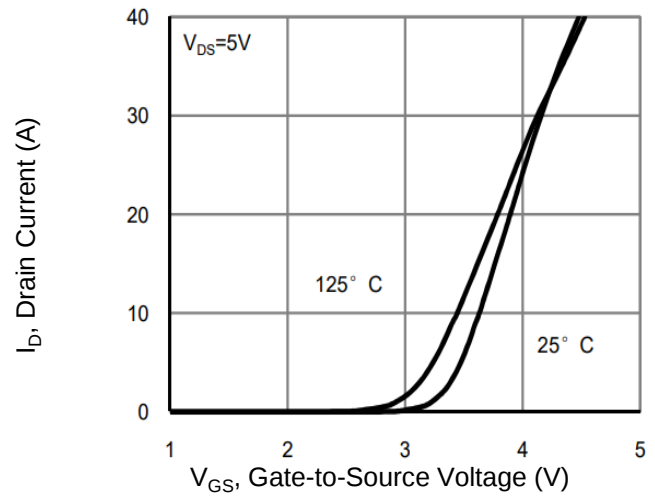


Figure 3. Drain-Source On-Resistance

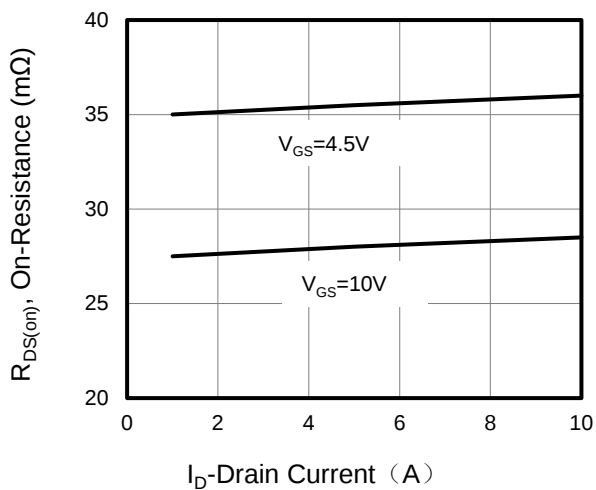


Figure 4. Gate Charge

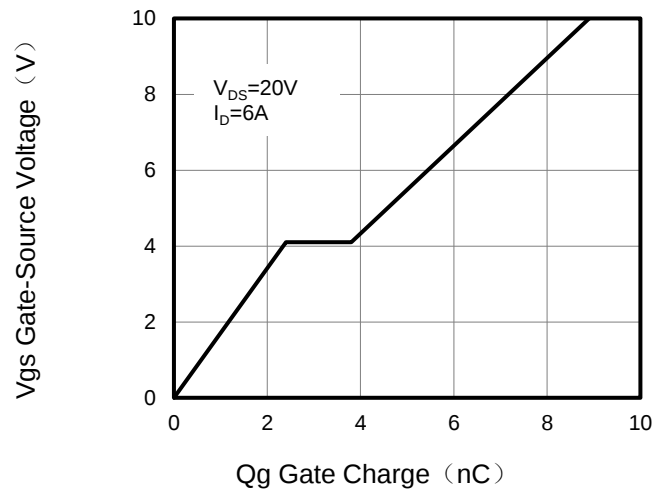


Figure 5. Capacitance

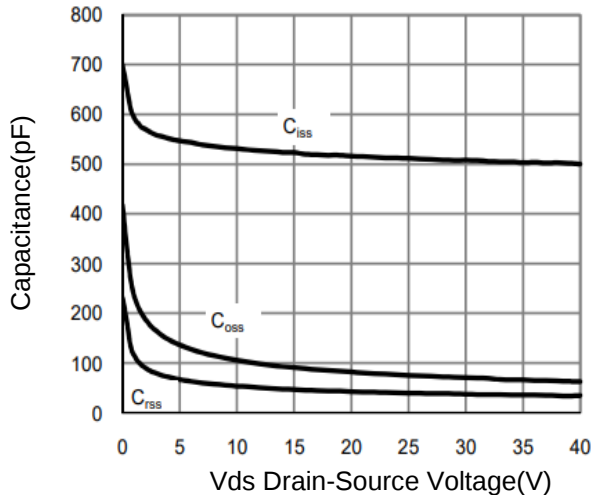
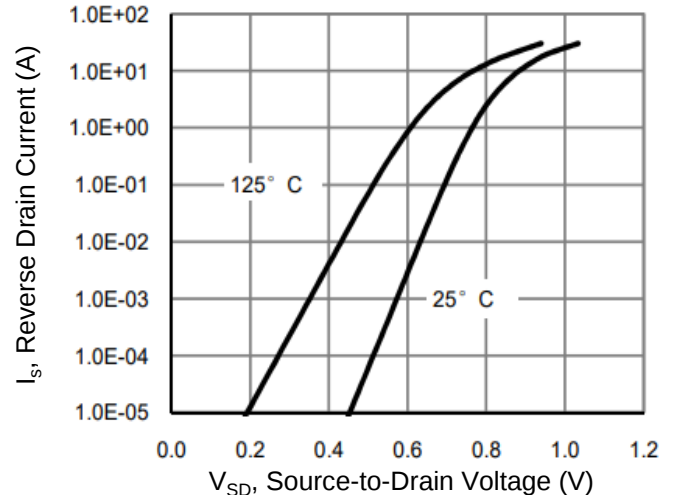
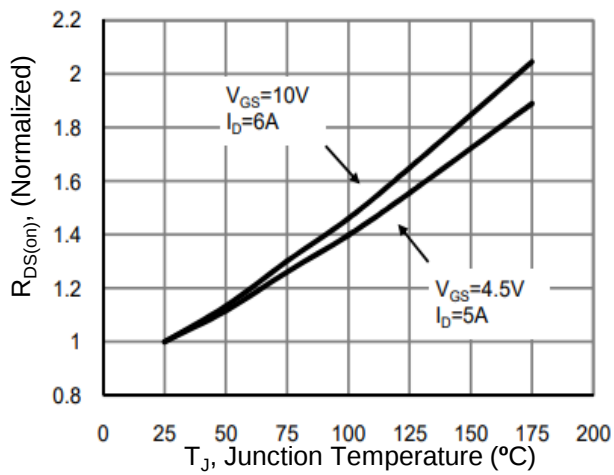
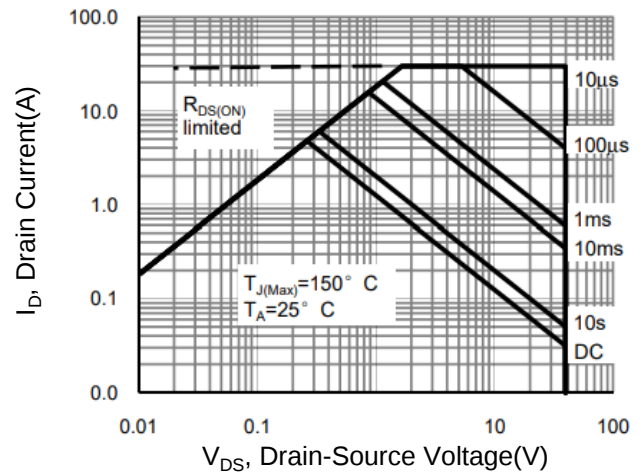
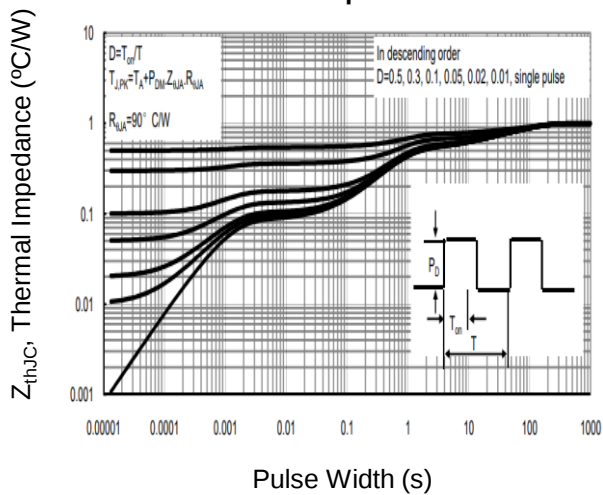


Figure 6. Source-Drain Diode Forward



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

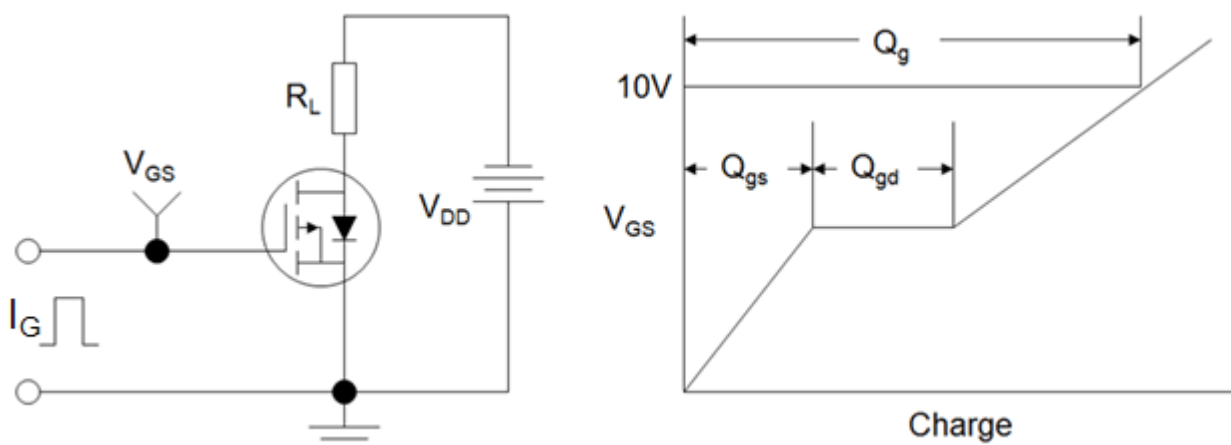
Figure 7. Drain-Source On-Resistance

Figure 10. Safe Operation Area

Figure 9. Normalized Maximum Transient Thermal Impedance


PMOS Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-40	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -40V, V _{GS} = 0V, T _J = 25°C	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.9	-2.5	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -1A	--	26	37	mΩ
		V _{GS} = -10V, I _D = -10A	--	26	37	
		V _{GS} = -4.5V, I _D = -1A	--	28	54	
		V _{GS} = -4.5V, I _D = -10A	--	28	54	
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-8A	20	--	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -20V, f = 1.0MHz	--	520	--	pF
Output Capacitance	C _{oss}		--	100	--	
Reverse Transfer Capacitance	C _{rss}		--	65	--	
Total Gate Charge	Q _g	V _{DD} = -20V, I _D = -10A, 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 = -10A, R _G = 6Ω	--	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	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-10	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -10A, V _{GS} = 0V	--	--	-1.2	V

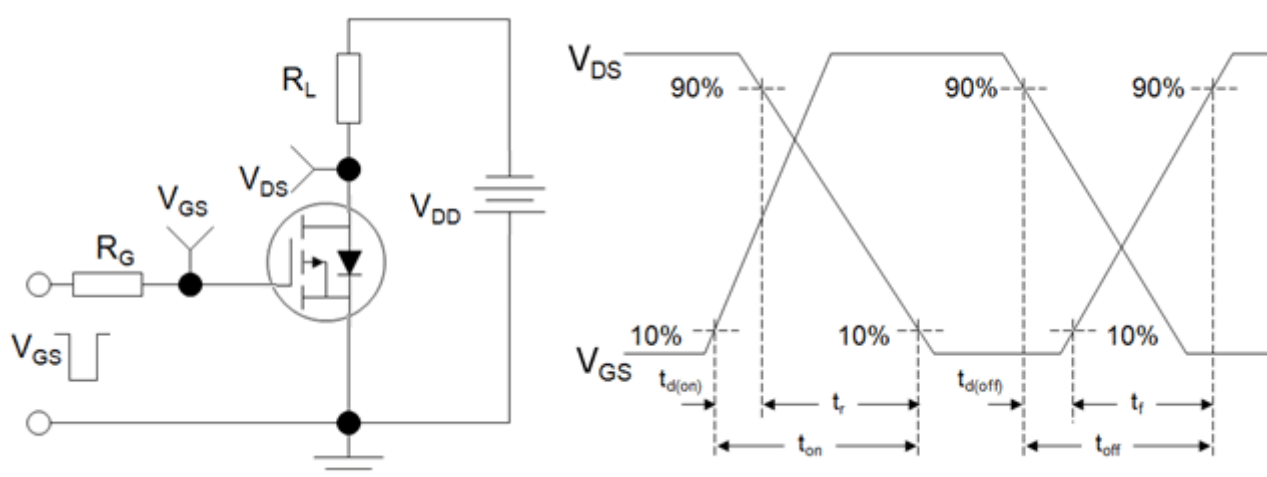
Notes

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

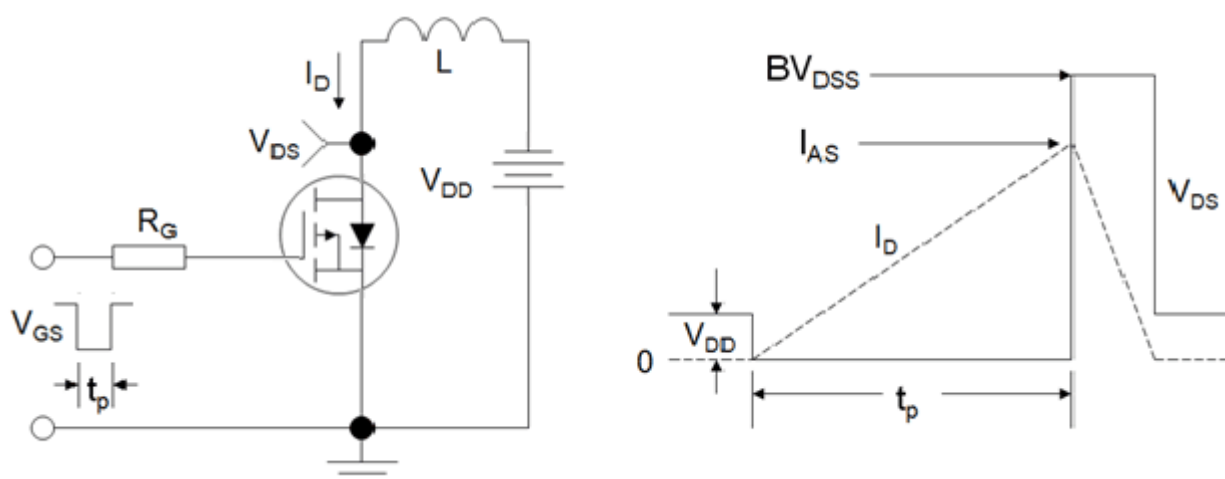
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

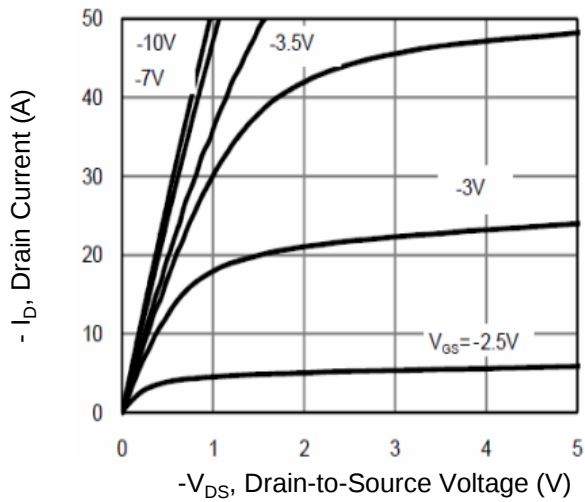


Figure 2. Transfer Characteristics

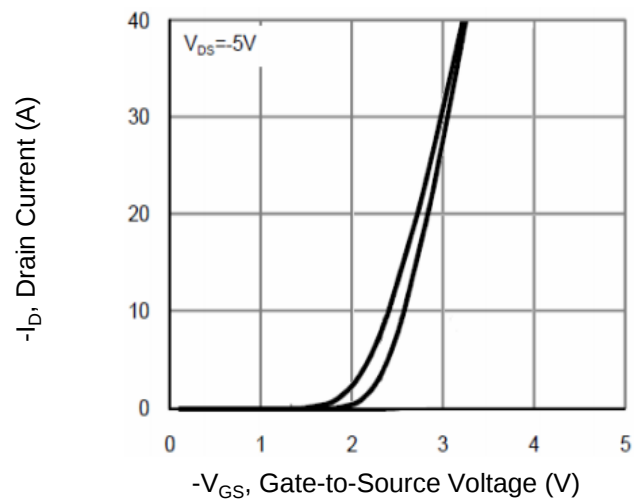
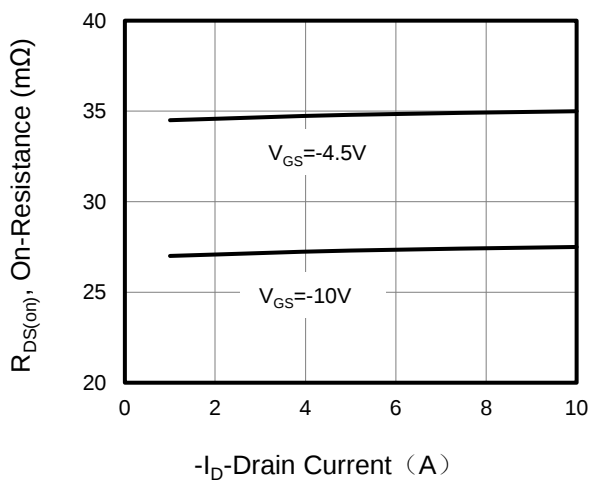
Figure 3. $R_{DS(on)}$ -Drain Current

Figure 4. Gate Charge

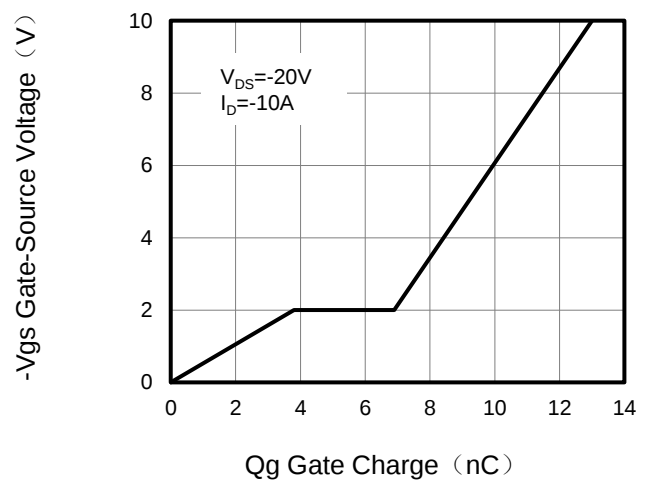


Figure 5. Capacitance

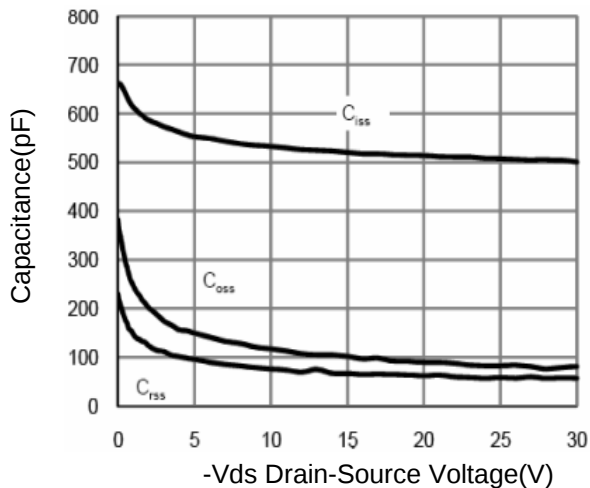
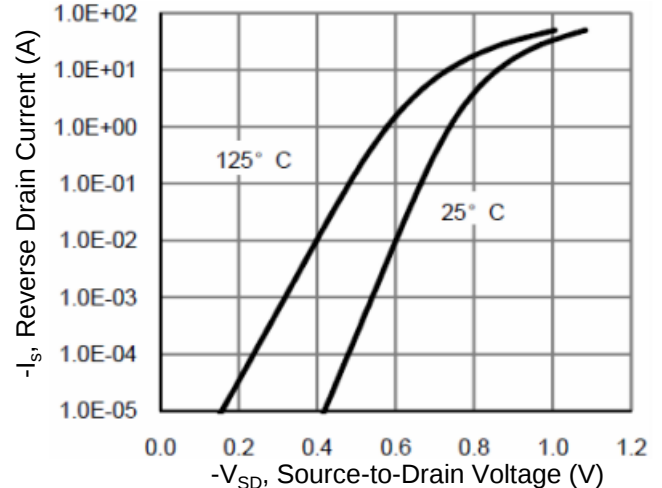


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

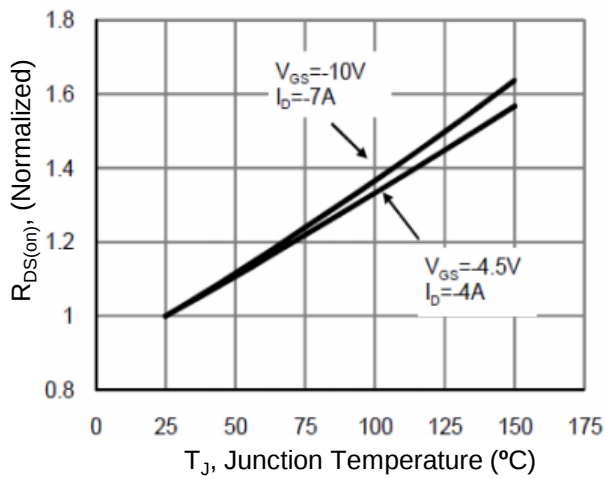


Figure 8. Safe Operation Area

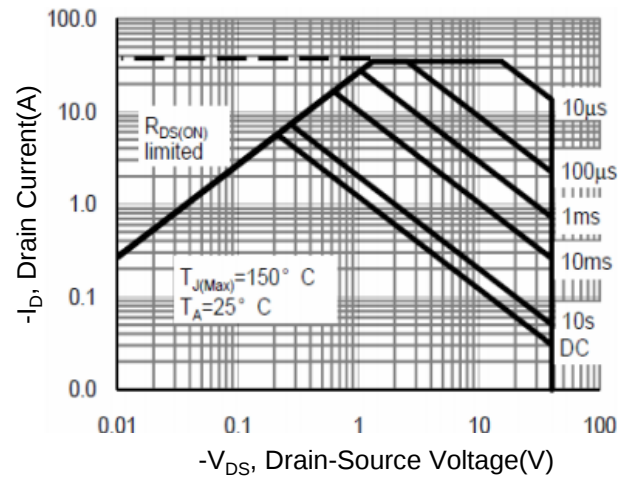
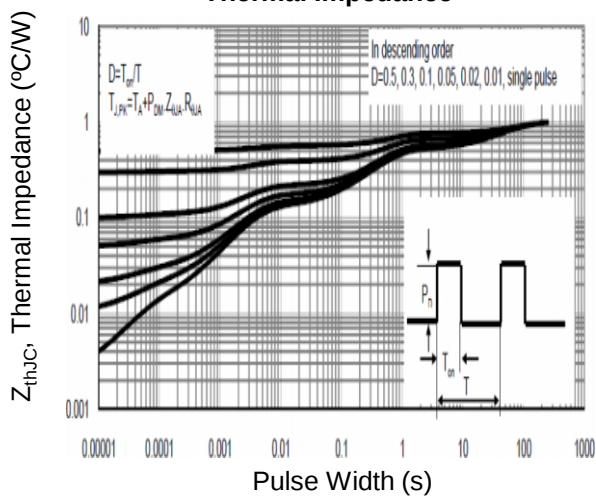
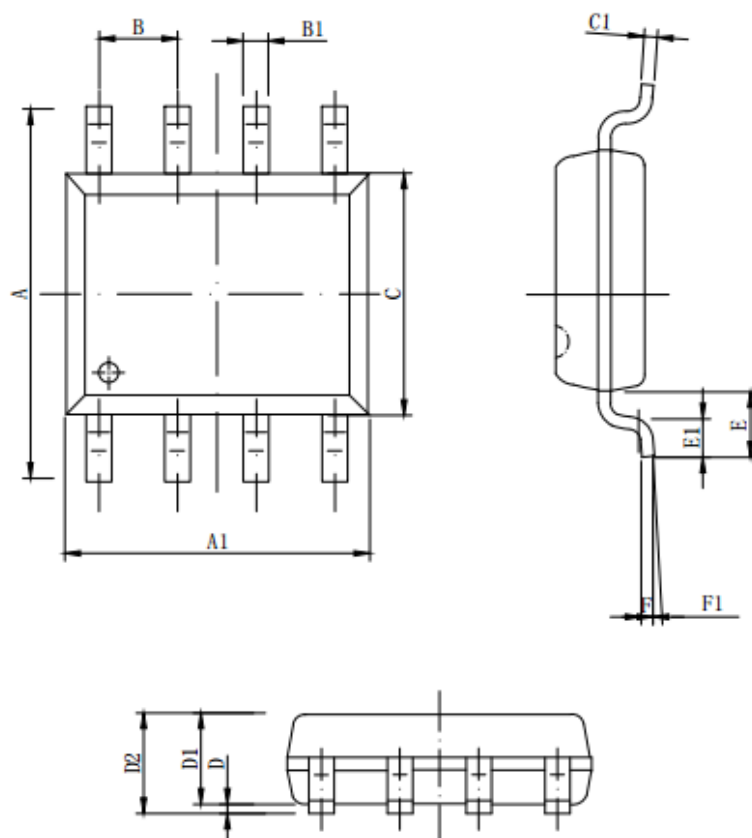


Figure 9. Normalized Maximum Transient Thermal Impedance



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 ^{8x}	0.40 ^{8x}	0.45 ^{8x}
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°