

N-Channel and P-Channel Enhancement Mode Power MOSFET

Features

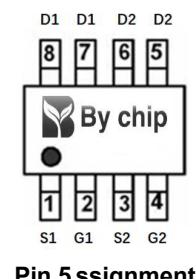
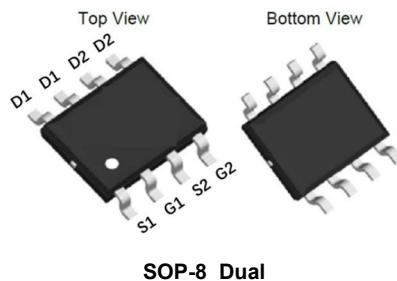
- N-Channel: 60V, 5A
 $R_{DS(ON)} < 28 \text{ m}\Omega @ V_{GS} = 10\text{V}$
 $R_{DS(ON)} < 31 \text{ m}\Omega @ V_{GS} = 4.5\text{V}$
- P-Channel: -60V, -3.1A
 $R_{DS(ON)} < 62 \text{ m}\Omega @ V_{GS} = -10\text{V}$
 $R_{DS(ON)} < 72 \text{ m}\Omega @ V_{GS} = -4.5\text{V}$

General Features

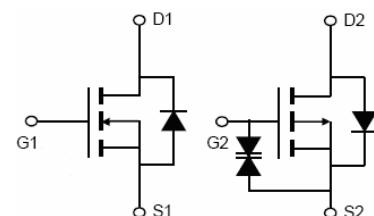
- Advanced Trench Technology
- Provide Excellent RDS(ON) and Low Gate Charge
- Lead Free and Green Available

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Pin Assignment



Schematic diagram

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

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	V_{DS}	60	-60	V
Continuous Drain Current	I_D	5	-3.1	A
Pulsed Drain Current (note1)	I_{DM}	20	-12.4	A
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Power Dissipation	P_D	2.5	1.9	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	-55 To 150	$^\circ\text{C}$

Thermal Resistance

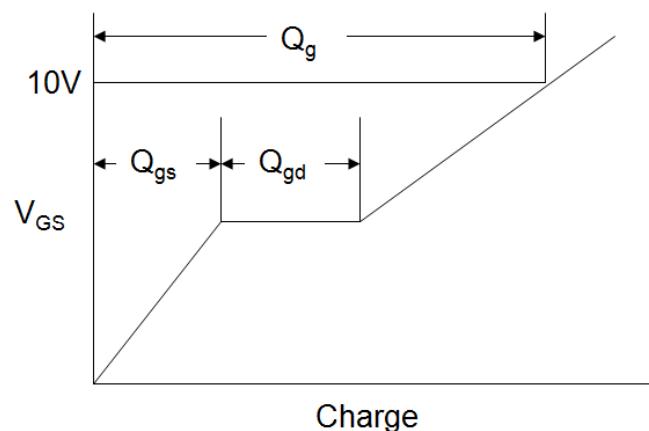
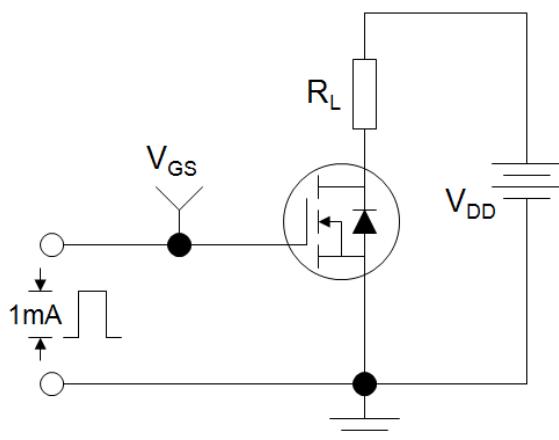
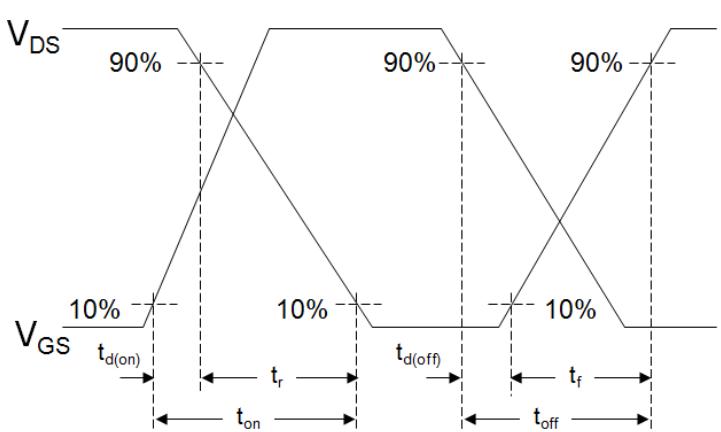
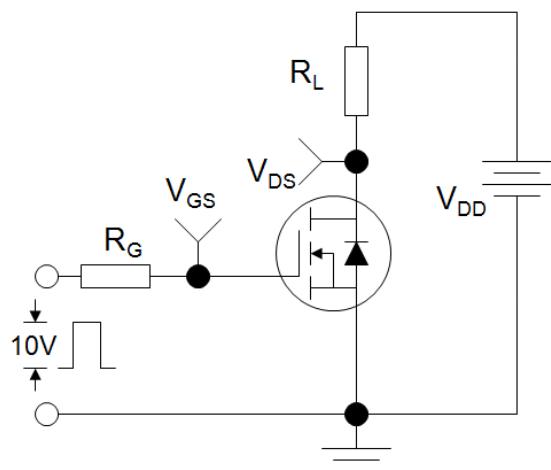
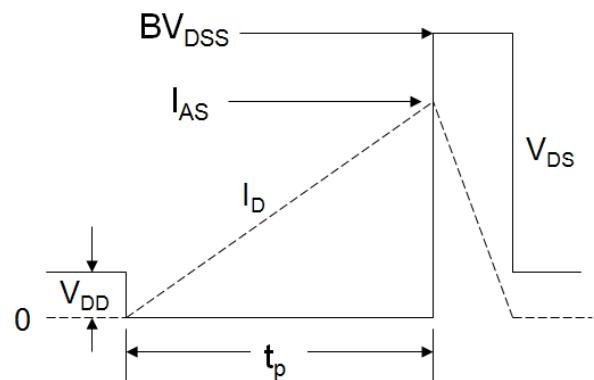
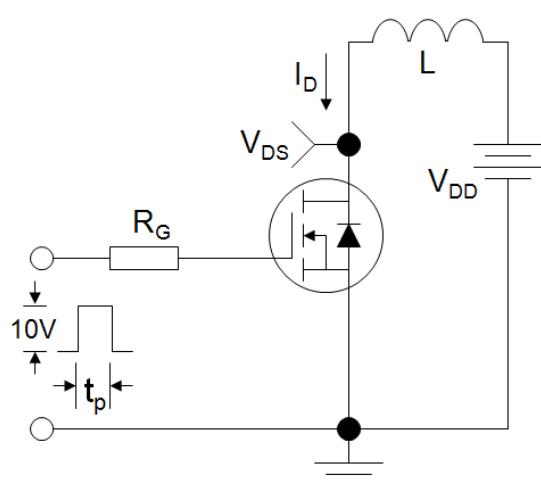
Parameter	Symbol	NMOS	PMOS	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	65	$^\circ\text{C/W}$

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

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = 250\mu\text{A}$	60	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 60\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^\circ\text{C}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 20\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250\mu\text{A}$	1.0		2.5	V
Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_D = 4.3\text{A}$	--		28	$\text{m}\Omega$
		$V_{\text{GS}} = 4.5\text{V}, I_D = 3.9\text{A}$	--		31	
Forward Transconductance	g_{FS}	$V_{\text{DS}}=5\text{V}, I_D=4.3\text{A}$	--	9.6	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = 30\text{V}, f = 1.0\text{MHz}$	--	1336	--	pF
Output Capacitance	C_{oss}		--	56	--	
Reverse Transfer Capacitance	C_{rss}		--	52	--	
Total Gate Charge	Q_g	$V_{\text{DS}} = 30\text{V}, I_D = 5\text{A}, V_{\text{GS}} = 10\text{V}$	--	22	--	nC
Gate-Source Charge	Q_{gs}		--	3.3	--	
Gate-Drain Charge	Q_{gd}		--	5.2	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 30\text{V}, I_D = 5\text{A}, R_G = 3\Omega$	--	5.2	--	ns
Turn-on Rise Time	t_r		--	3	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	17	--	
Turn-off Fall Time	t_f		--	2.5	--	
Drain-Source Body Diode Characteristics						
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{\text{SD}} = 1.7\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	1.2	V
Continuous Body Diode Current	I_s	$T_C = 25^\circ\text{C}$	--	--	5	A

Notes

- Repetitive Rating: Pulse width limited by maximum junction temperature
- 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

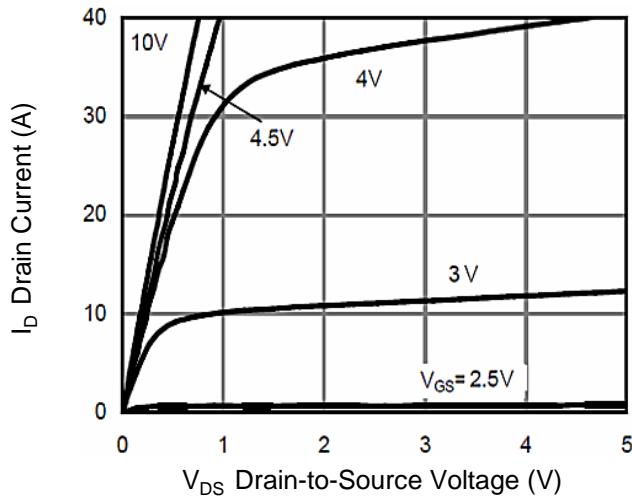


Figure 2. Transfer Characteristics

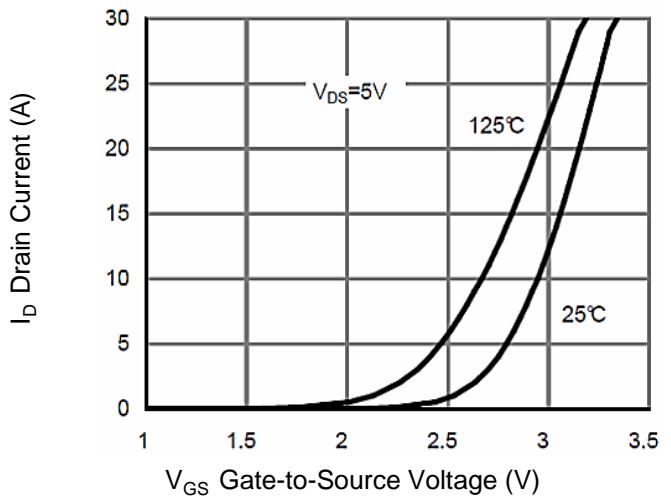


Figure 3. Drain-Source On-Resistance

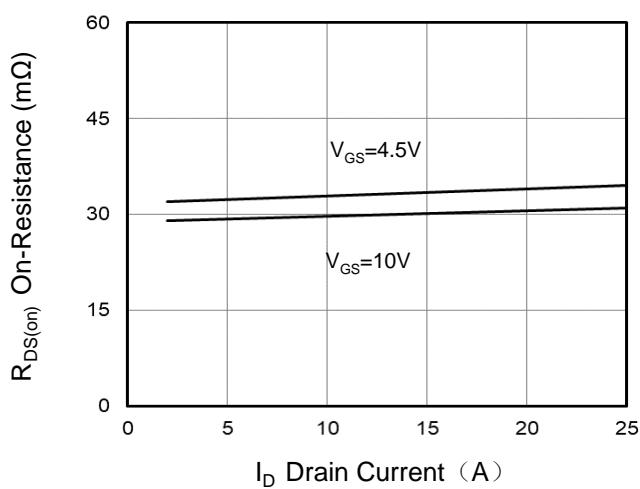


Figure 4. Gate Charge

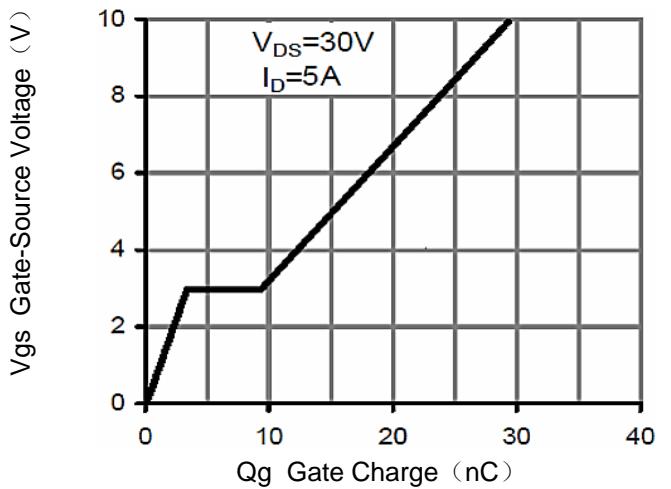


Figure 5. Capacitance

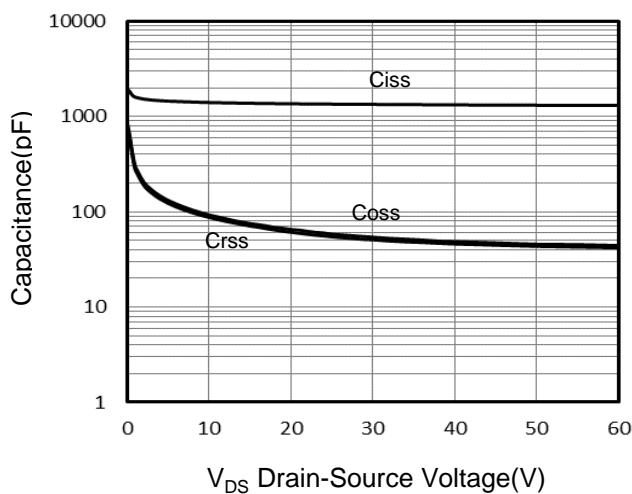
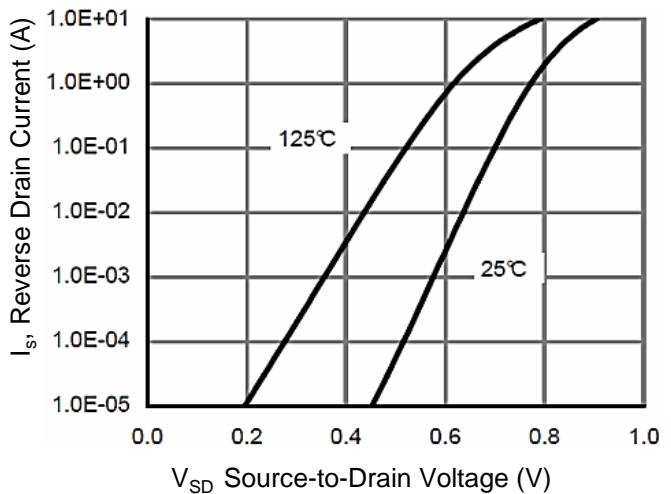


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

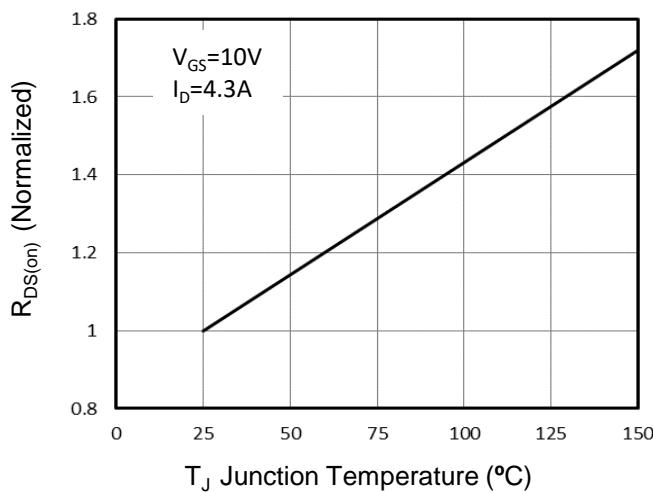


Figure 8. Safe Operation Area

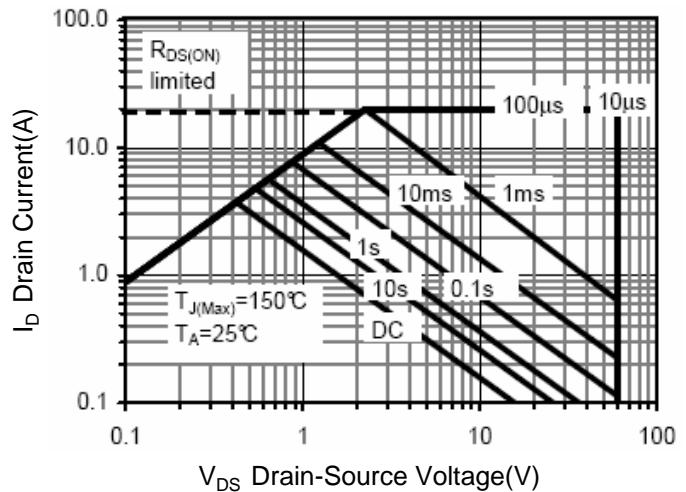
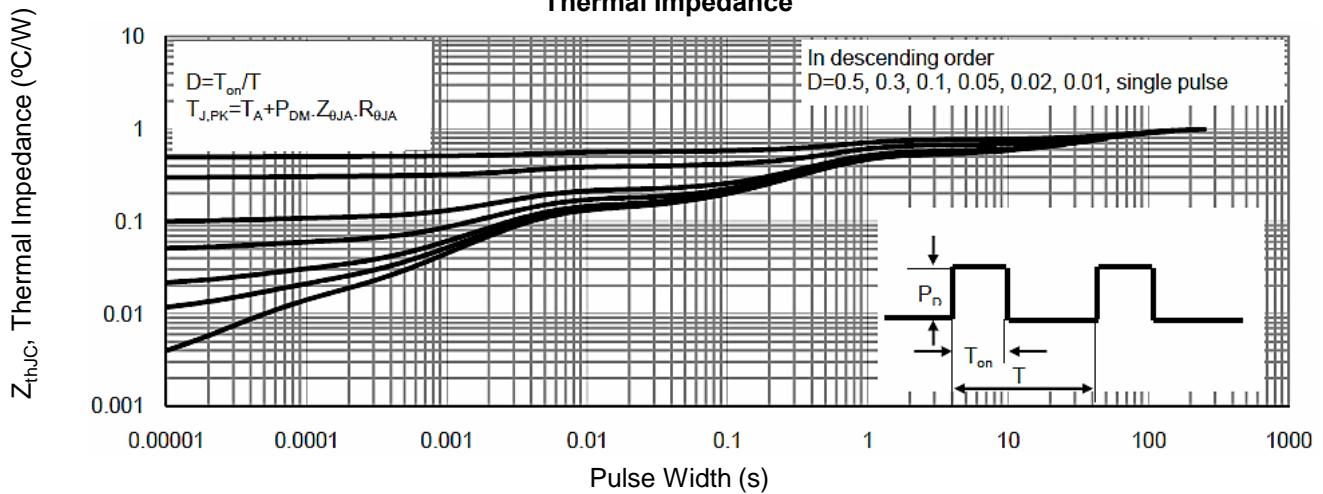


Figure 9. Normalized Maximum Transient Thermal Impedance

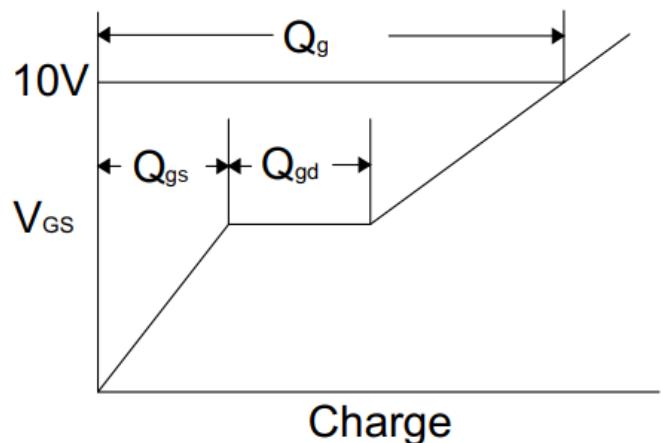
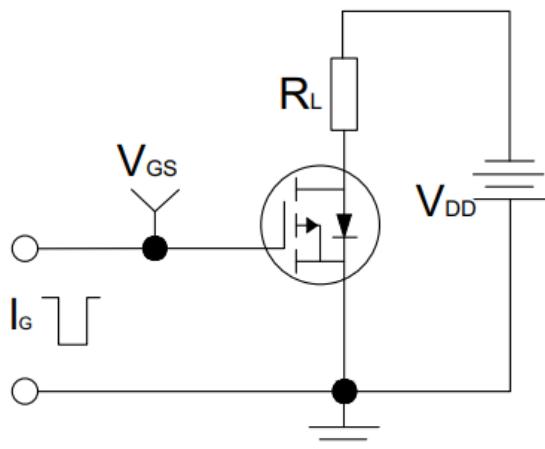
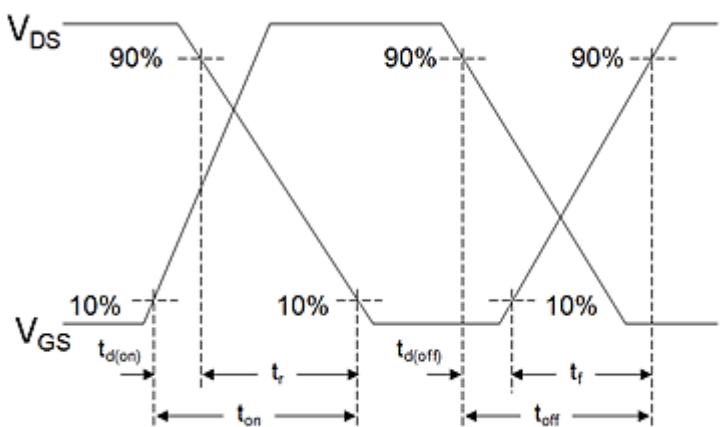
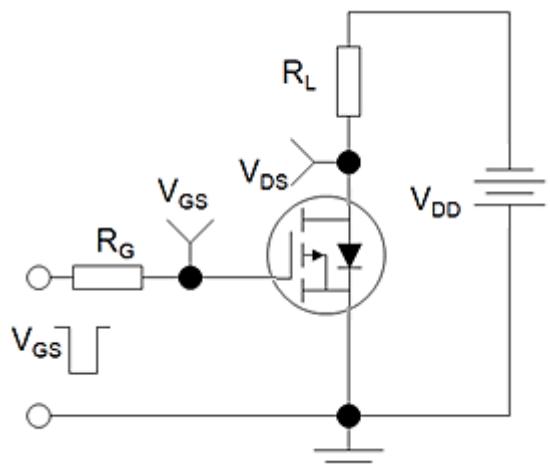
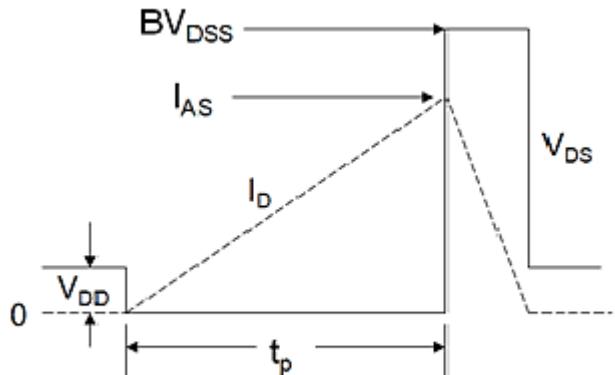
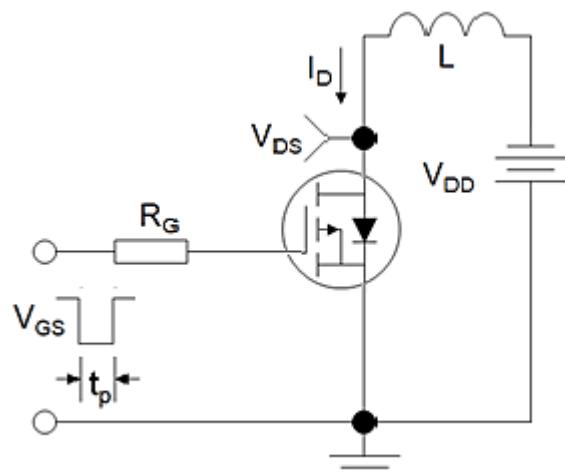


PMOS Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = -250\mu\text{A}$	-60	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = -60\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^\circ\text{C}$	--	--	-1	μA
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 20\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = -250\mu\text{A}$	-1.0		-2.5	V
Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10\text{V}, I_D = -3.1\text{A}$	--		62	$\text{m}\Omega$
		$V_{\text{GS}} = -4.5\text{V}, I_D = -0.2\text{A}$	--		72	
Forward Transconductance	g_{FS}	$V_{\text{DS}} = -5\text{V}, I_D = -3.1\text{A}$	--	6.6	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = -30\text{V}, f = 1.0\text{MHz}$	--	1454	--	pF
Output Capacitance	C_{oss}		--	62	--	
Reverse Transfer Capacitance	C_{rss}		--	58	--	
Total Gate Charge	Q_g	$V_{\text{DD}} = -30\text{V}, I_D = -3\text{A}, V_{\text{GS}} = -10\text{V}$	--	37	--	nC
Gate-Source Charge	Q_{gs}		--	4.5	--	
Gate-Drain Charge	Q_{gd}		--	10.5	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -30\text{V}, I_D = -3\text{A}, R_G = 3\Omega$	--	8	--	ns
Turn-on Rise Time	t_r		--	4	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	32	--	
Turn-off Fall Time	t_f		--	7	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_s	$T_C = 25^\circ\text{C}$	--	--	-3.1	A
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{\text{SD}} = -2\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	-1.2	V

Notes

- Repetitive Rating: Pulse width limited by maximum junction temperature
- 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

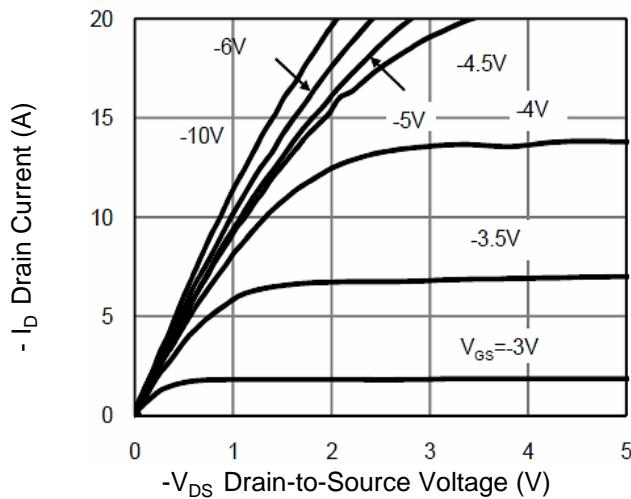


Figure 2. Transfer Characteristics

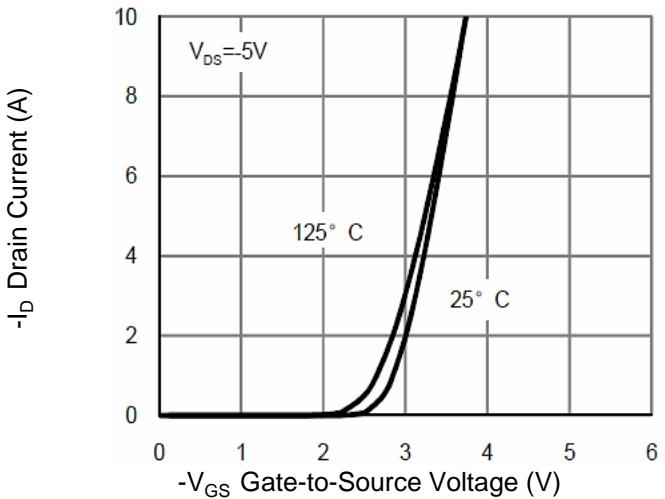


Figure 3. Rdson-Drain Current

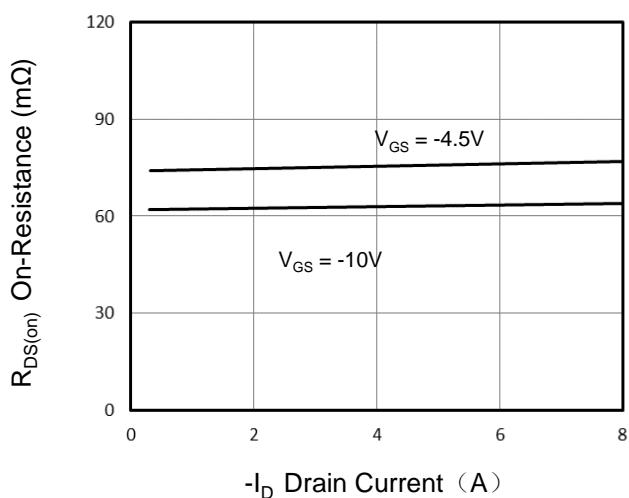


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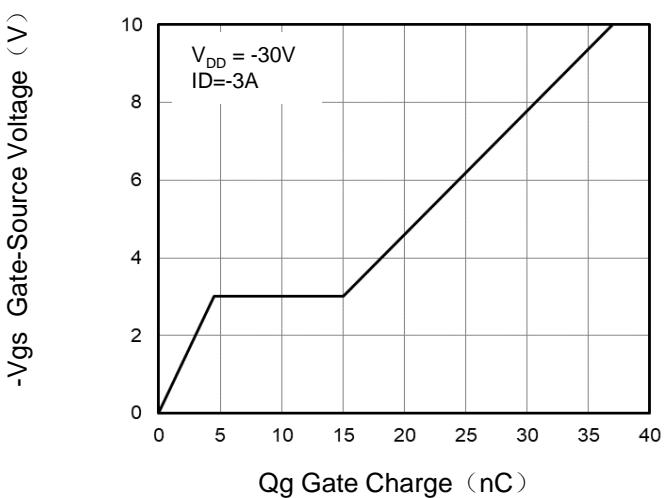


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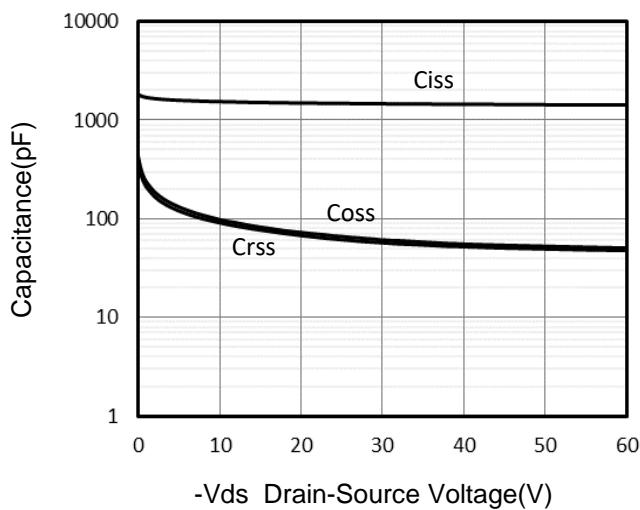
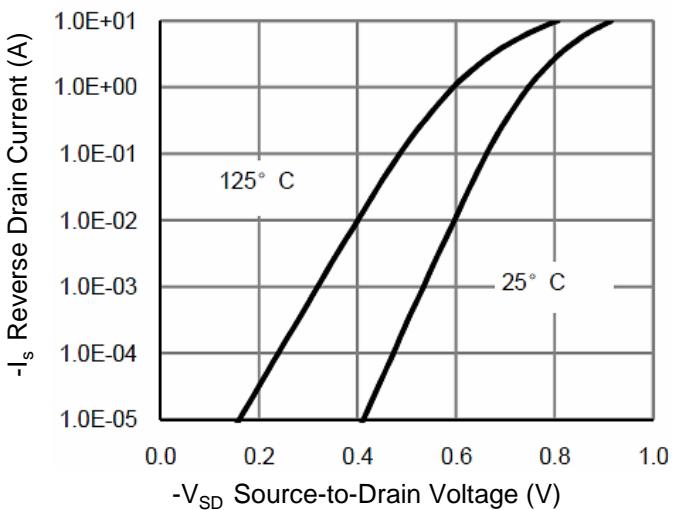


Figure 6. Source-Drain Diode Forward



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Figure 7. Drain-Source On-Resistance

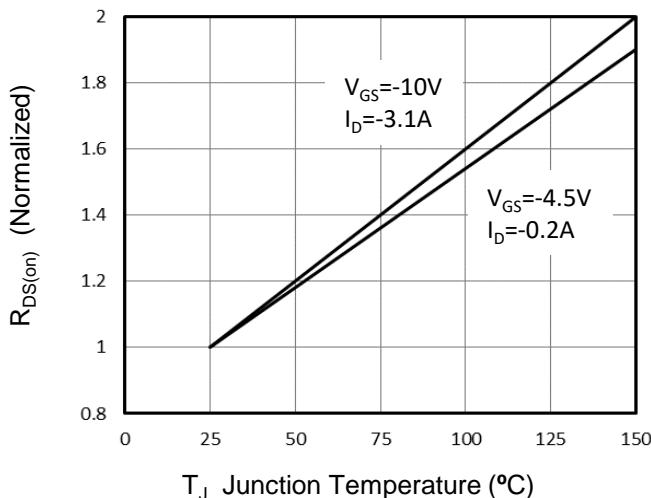


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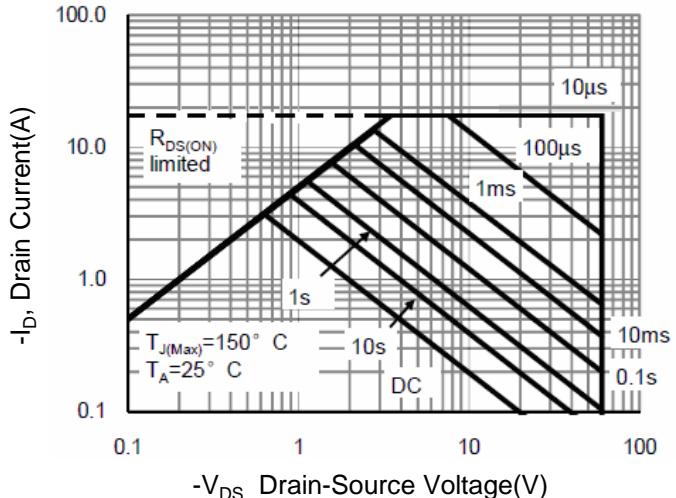


Figure 9. Normalized Maximum Transient Thermal Impedance

