

N and P Channel Enhancement Mode Power MOSFET

Description

The G300C03L6 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

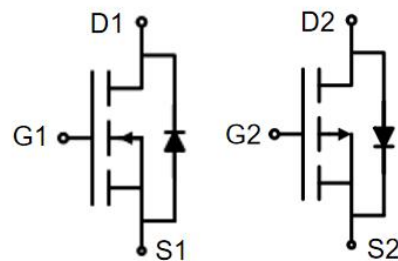
General Features

- NMOS
- V_{DS} 30V
- I_D (at $V_{GS} = 10V$) 5.6A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 27m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 4.5V$) < 30m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 2.5V$) < 65m Ω
- 100% Avalanche Tested
- RoHS Compliant

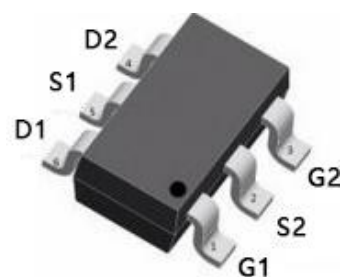
- PMOS
- V_{DS} -30V
- I_D (at $V_{GS} = -10V$) -4.2A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 55m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 65m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -2.5V$) < 90m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



SOT-23-6

Ordering Information

Device	Package	Marking	Packaging
G300C03L6	SOT-23-6	G300C03	3000pcs/Reel

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

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Continuous Drain Current	I_D	5.6	-4.2	A
Pulsed Drain Current (note1)	I_{DM}	22.4	-16.8	A
Gate-Source Voltage	V_{GS}	± 12	± 12	V
Power Dissipation	P_D	1.4	1.2	W
Single pulse avalanche energy (note2)	E_{AS}	10	14	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	-55 To 150	$^\circ\text{C}$

Thermal Resistance

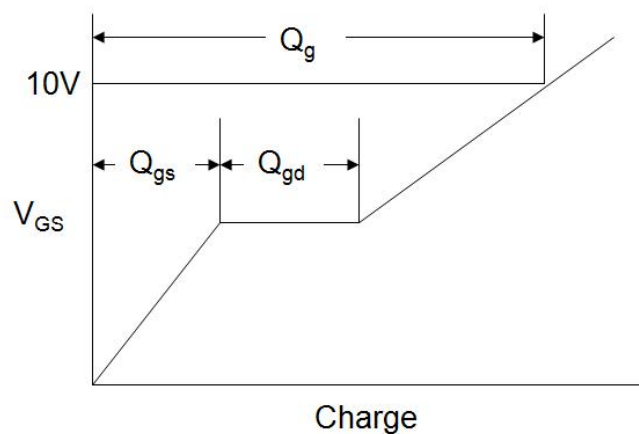
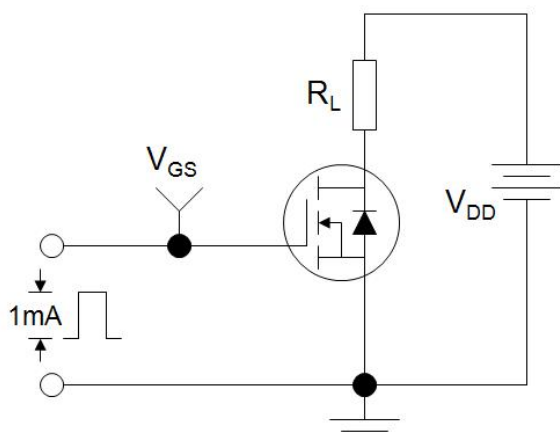
Parameter	Symbol	NMOS	PMOS	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	89	104	$^\circ\text{C/W}$

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	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 30\text{V}, V_{\text{GS}} = 0\text{V}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 12\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = 250\mu\text{A}$	0.7	1.0	1.3	V
Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_{\text{D}} = 3\text{A}$	--	22	27	m Ω
		$V_{\text{GS}} = 4.5\text{V}, I_{\text{D}} = 3\text{A}$	--	25	30	
		$V_{\text{GS}} = 2.5\text{V}, I_{\text{D}} = 2\text{A}$	--	38	65	
Forward Transconductance	g_{FS}	$V_{\text{GS}} = 5\text{V}, I_{\text{D}} = 3\text{A}$	--	10	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V},$ $V_{\text{DS}} = 15\text{V},$ $f = 1.0\text{MHz}$	--	547	--	pF
Output Capacitance	C_{oss}		--	69	--	
Reverse Transfer Capacitance	C_{rss}		--	57	--	
Total Gate Charge	Q_{g}	$V_{\text{DD}} = 15\text{V},$ $I_{\text{D}} = 3\text{A},$ $V_{\text{GS}} = 10\text{V}$	--	16	--	nC
Gate-Source Charge	Q_{gs}		--	2	--	
Gate-Drain Charge	Q_{gd}		--	1.8	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 15\text{V},$ $I_{\text{D}} = 3\text{A},$ $R_{\text{G}} = 3\Omega$	--	4	--	ns
Turn-on Rise Time	t_{r}		--	26	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	15	--	
Turn-off Fall Time	t_{f}		--	24	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_{S}	$T_{\text{C}} = 25^{\circ}\text{C}$	--	--	5.6	A
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}\text{C}, I_{\text{SD}} = 3\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	1.2	V
Reverse Recovery Charge	Q_{rr}	$I_{\text{F}} = 3\text{A}, V_{\text{GS}} = 0\text{V}$ $di/dt = 100\text{A}/\mu\text{s}$	--	1	--	nC
Reverse Recovery Time	T_{rr}		--	12	--	ns

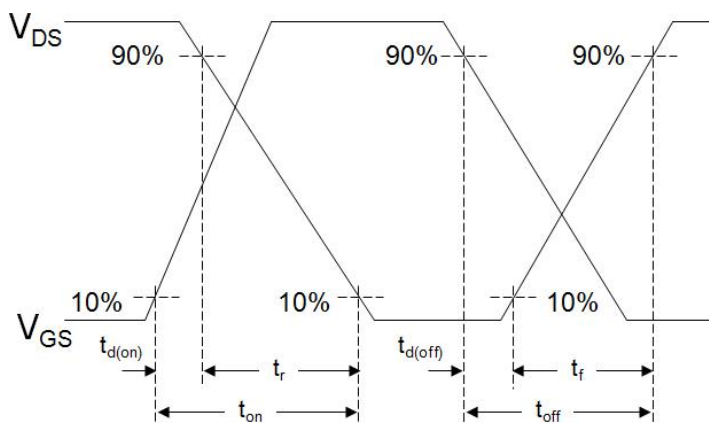
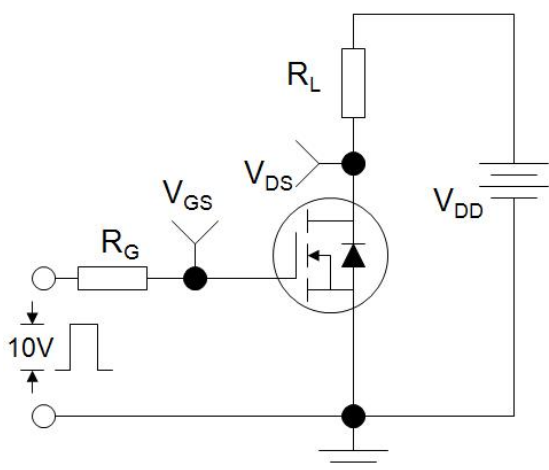
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = 30V$, $V_{GS} = 10V$, $L = 0.5mH$, $R_G = 25\Omega$
The table shows the minimum avalanche energy, which is 25mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

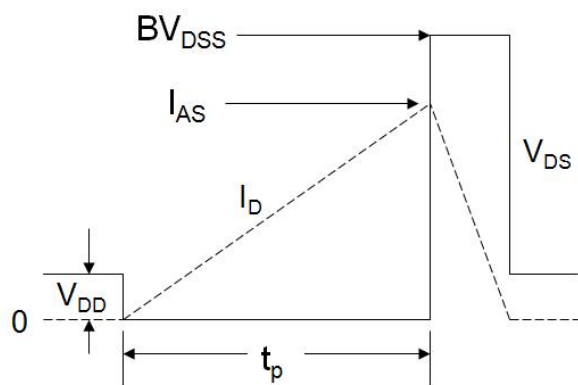
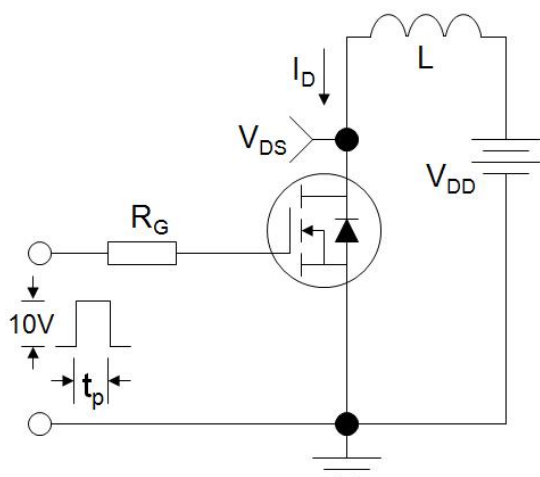
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

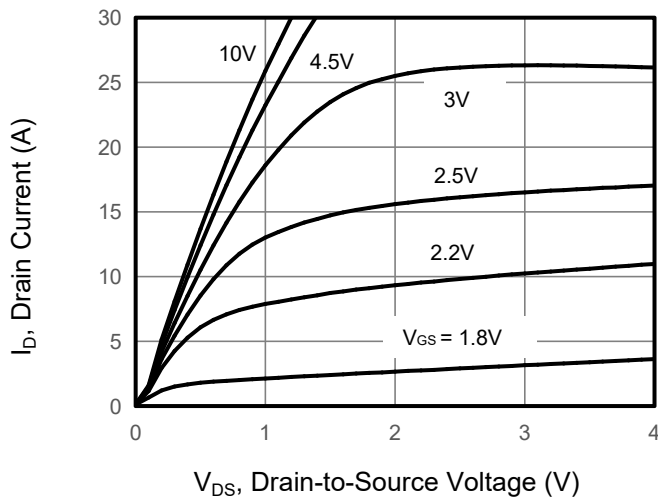


Figure 2. Transfer Characteristics

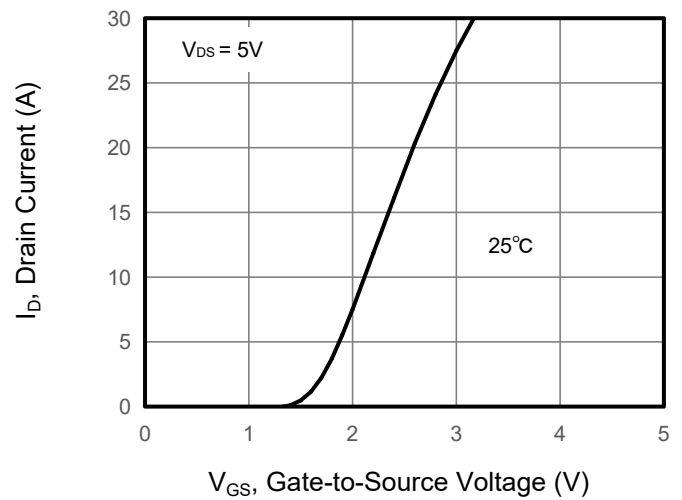


Figure 3. Drain Source On Resistance

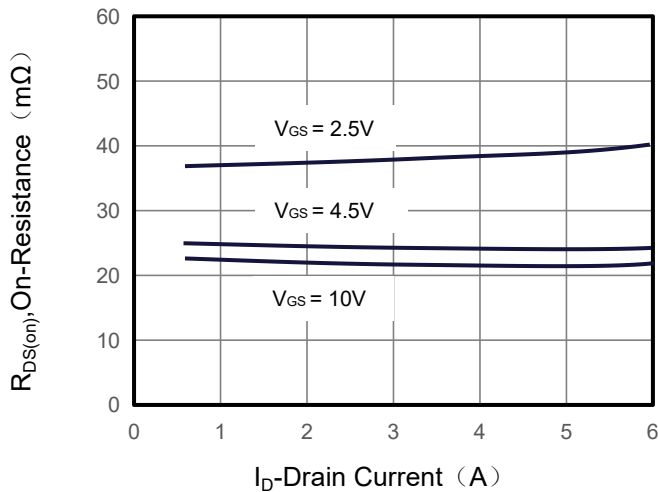


Figure 4. Gate Charge

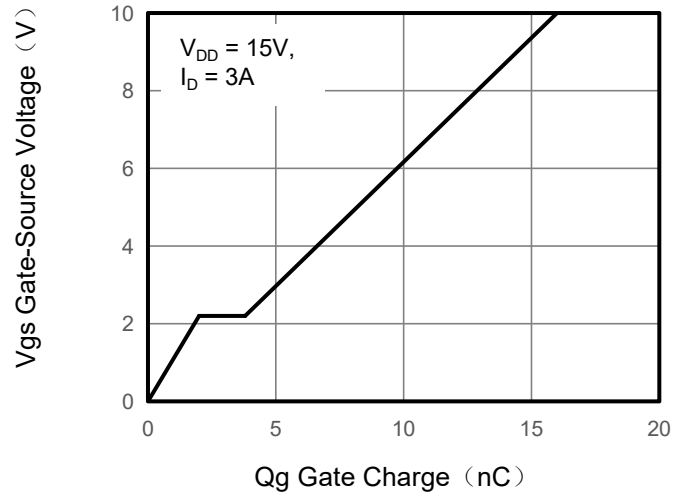


Figure 5. Capacitance

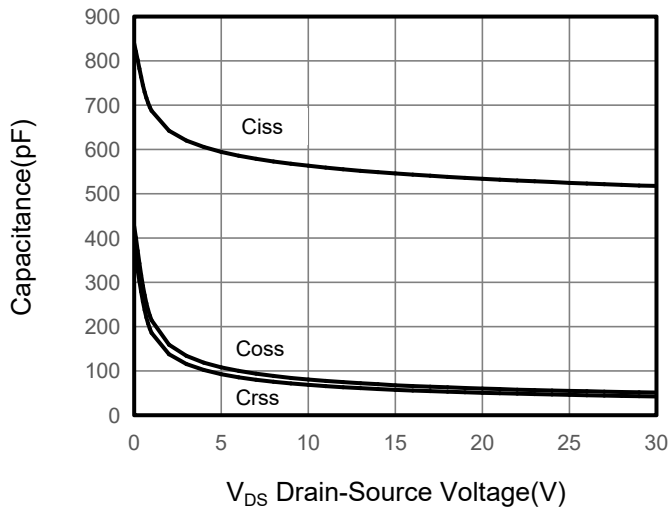
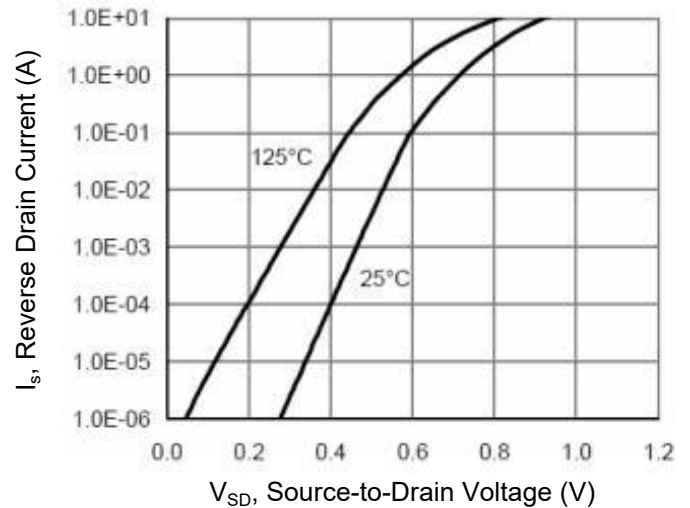


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

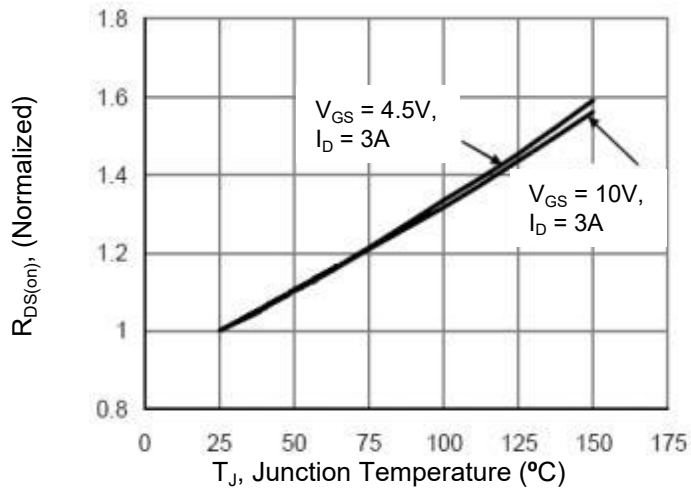


Figure 8. Safe Operation Area

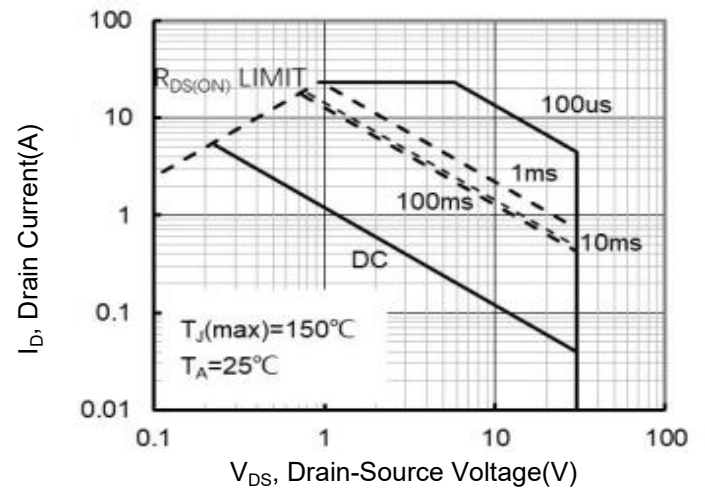
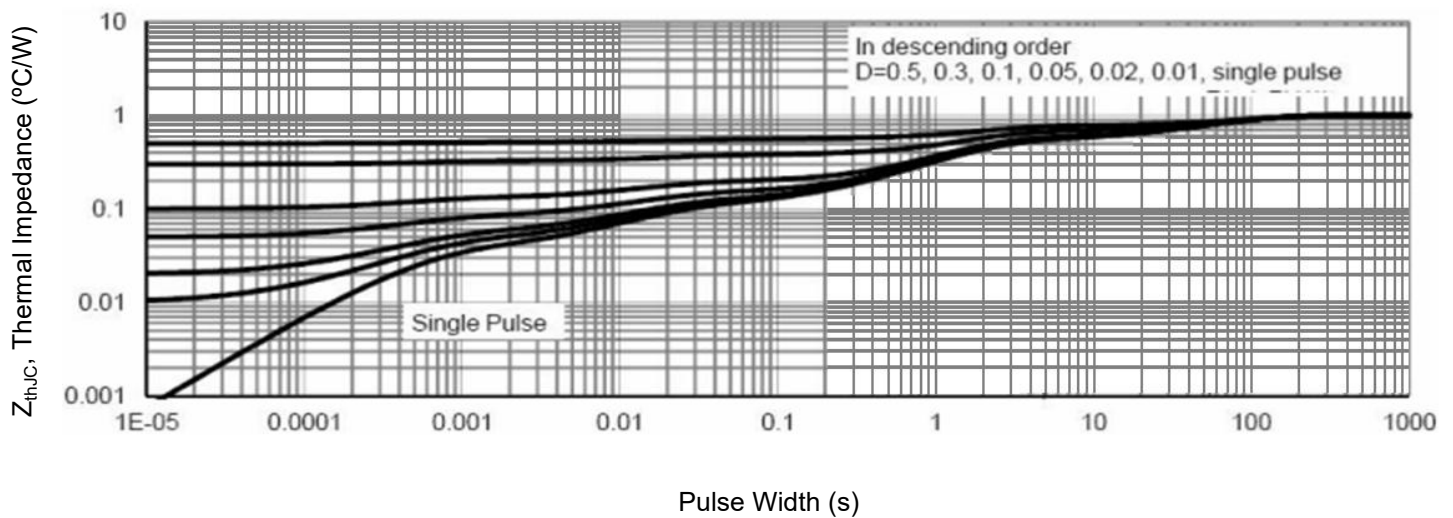


Figure 9. Normalized Maximum Transient Thermal Impedance

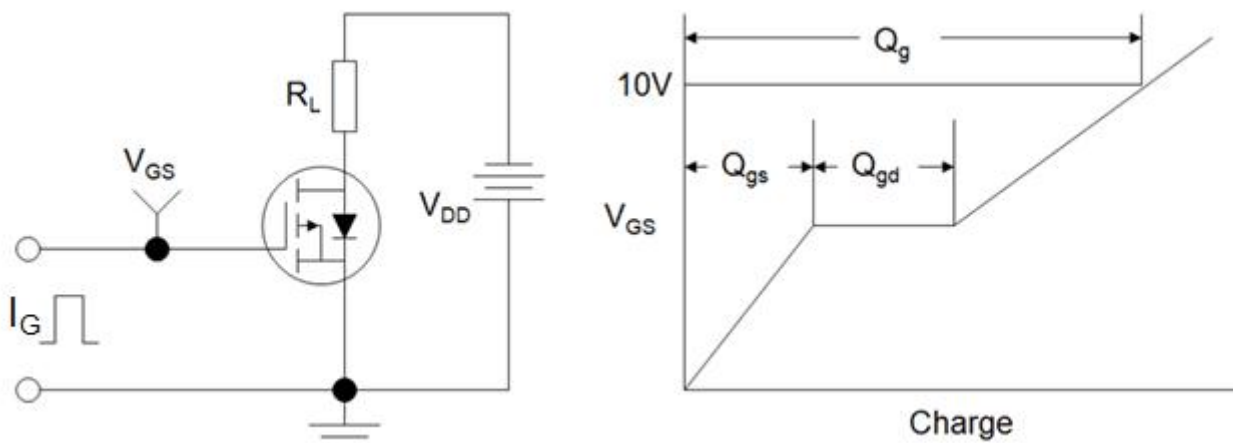


PMOS Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-30	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±12V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-0.6	-0.8	-1.3	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -3A	--	43	55	mΩ
		V _{GS} = -4.5V, I _D = -3A	--	51	65	
		V _{GS} = -2.5V, I _D = -2A	--	68	90	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -3A	--	10	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -15V, f = 1.0MHz	--	693	--	pF
Output Capacitance	C _{oss}		--	79	--	
Reverse Transfer Capacitance	C _{rss}		--	68	--	
Total Gate Charge	Q _g	V _{DD} = -15V, I _D = -4A, V _{GS} = -4.5V	--	8.5	--	nC
Gate-Source Charge	Q _{gs}		--	1.8	--	
Gate-Drain Charge	Q _{gd}		--	2.7	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -15V, I _D = -4A, R _G = 6Ω	--	7	--	ns
Turn-on Rise Time	t _r		--	3	--	
Turn-off Delay Time	t _{d(off)}		--	30	--	
Turn-off Fall Time	t _f		--	12	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-4.2	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -4A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -4A, V _{GS} = 0V di/dt=-100A/us	--	8	--	nC
Reverse Recovery Time	T _{rr}		--	14	--	ns

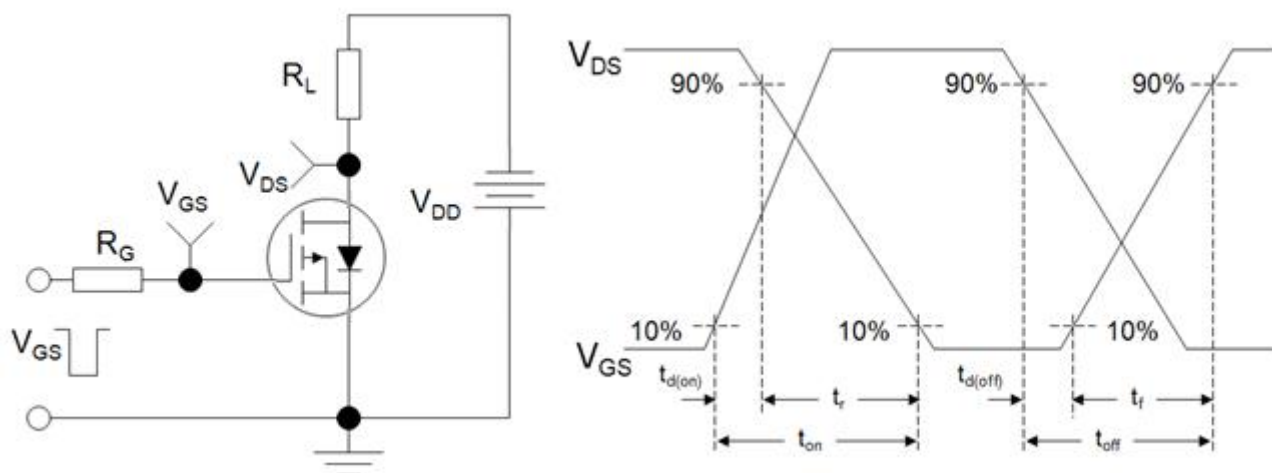
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = -30V$, $V_{GS} = -10V$, $L = 0.5mH$, $R_G = 25\Omega$
The table shows the minimum avalanche energy, which is 36mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

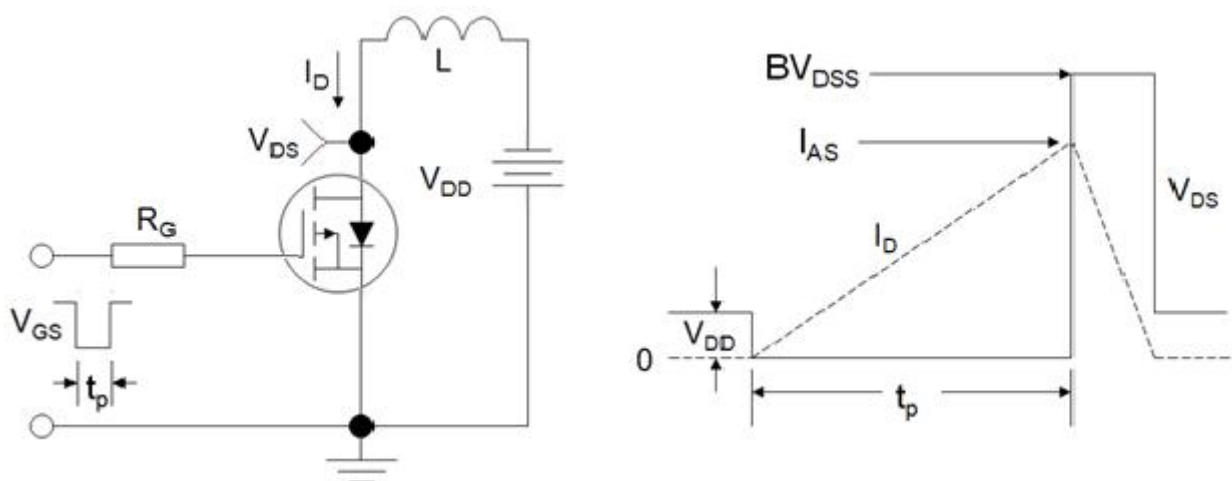
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

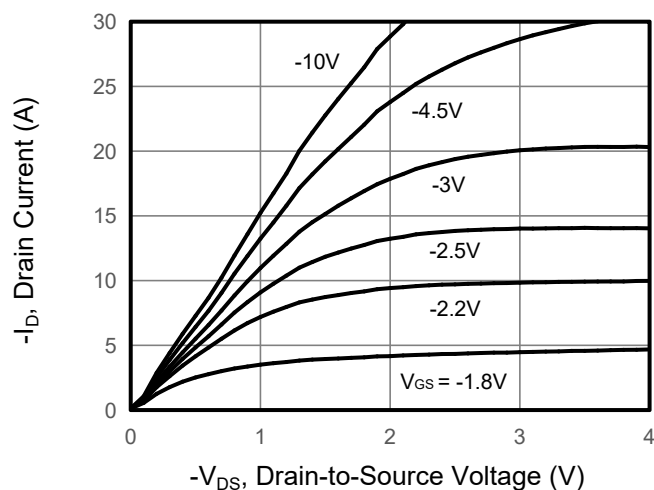


Figure 2. Transfer Characteristics

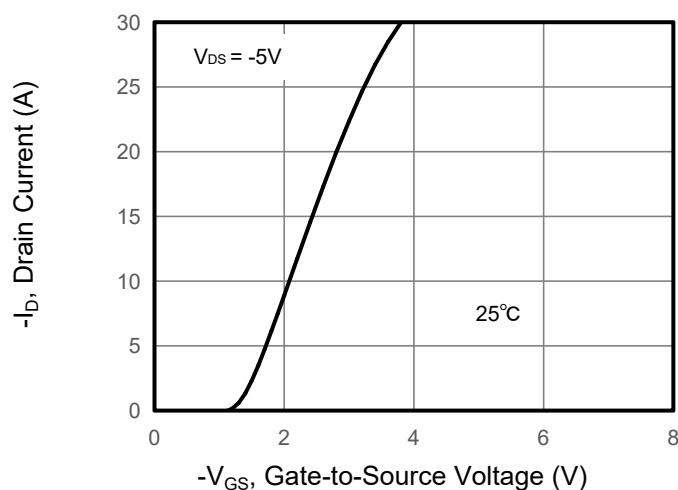


Figure 3. Drain Source On Resistance

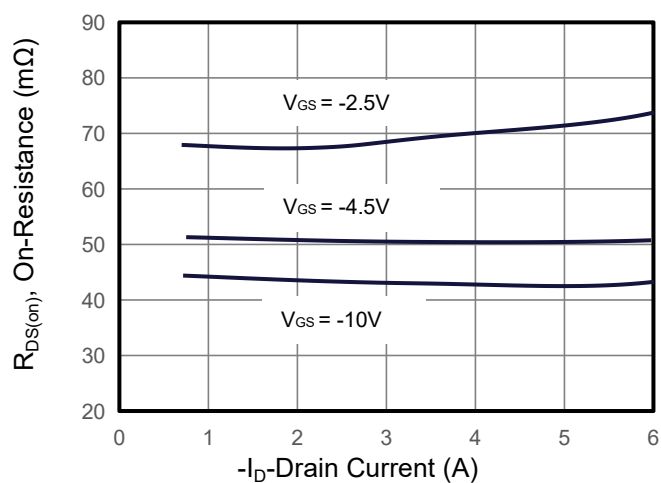


Figure 4. Gate Charge

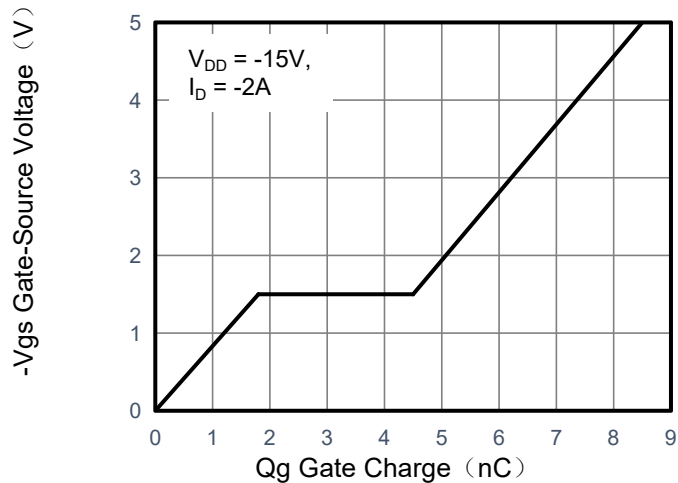


Figure 5. Capacitance

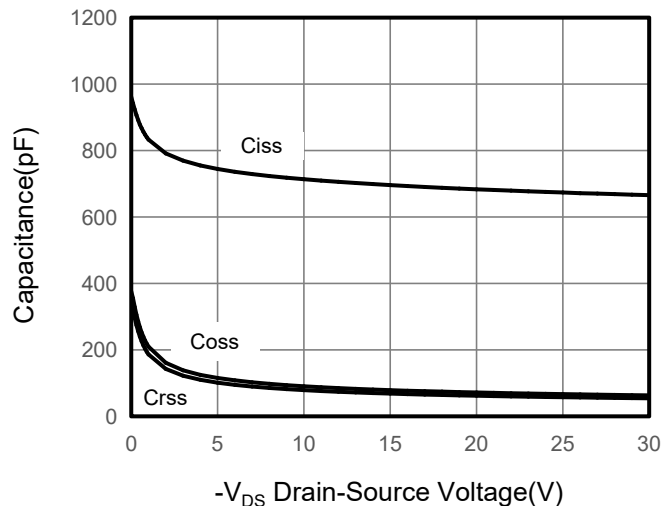
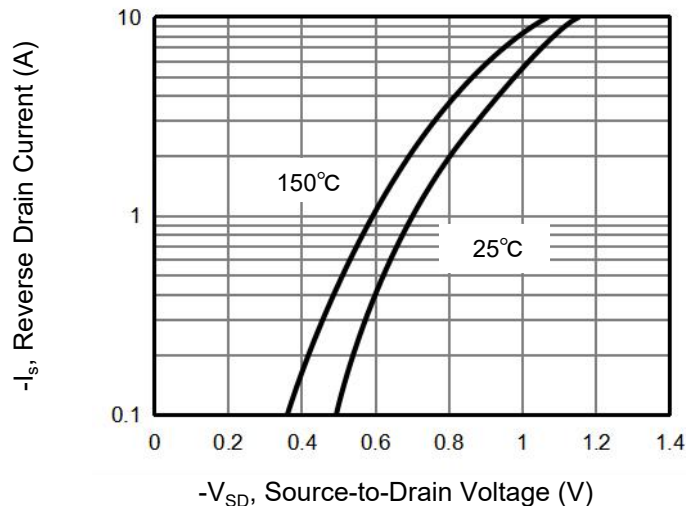


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

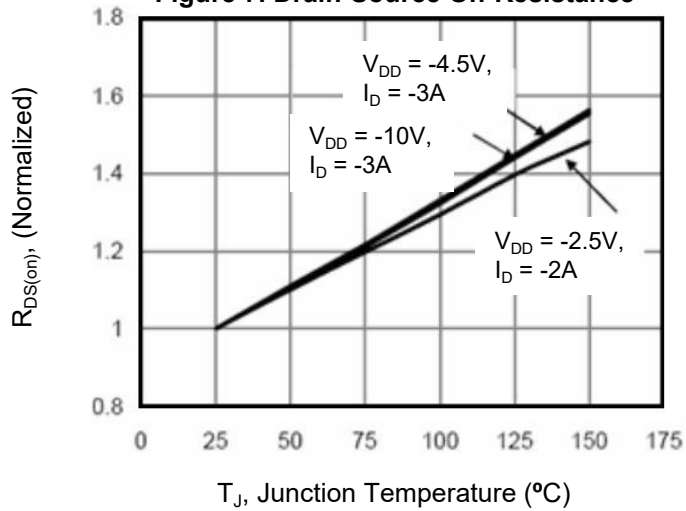


Figure 10. Safe Operation Area

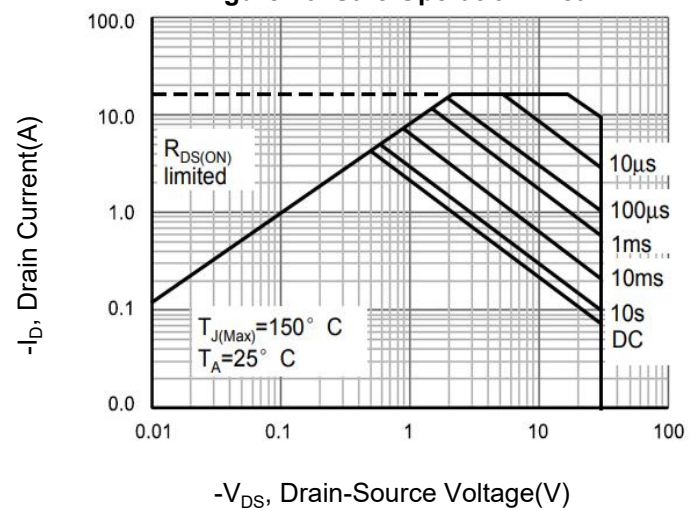
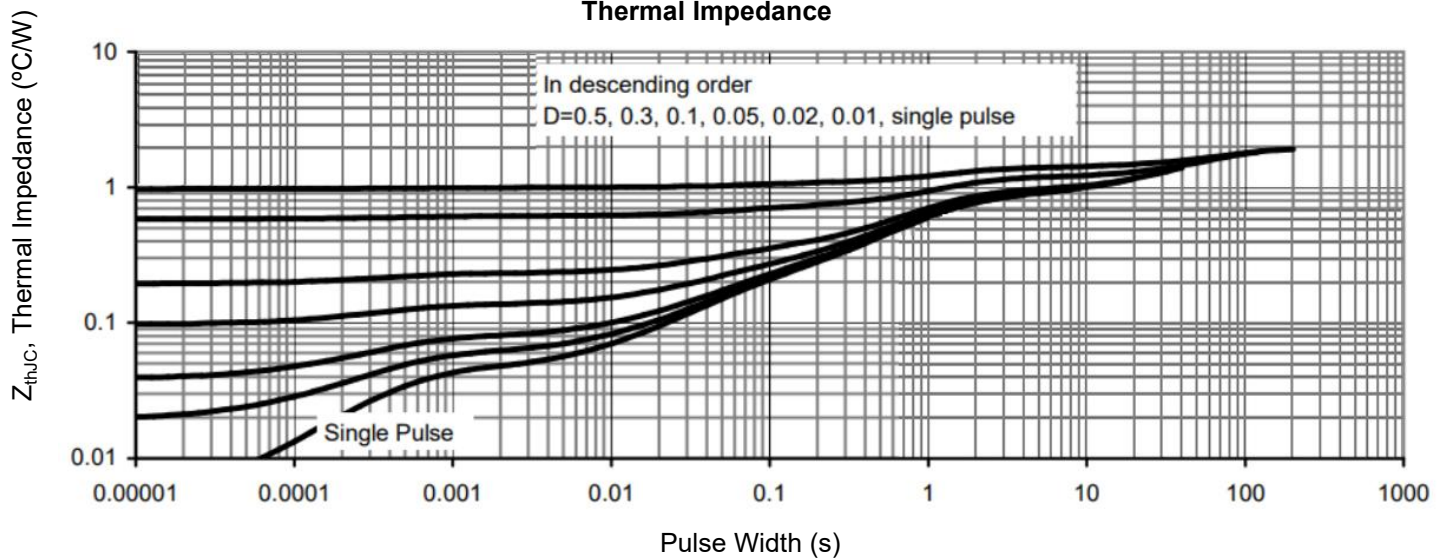


Figure 9. Normalized Maximum Transient Thermal Impedance



SOT-23-6 Package Information

