

N and P Channel Enhancement Mode Power MOSFET

Description

The G1NP02LLE uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

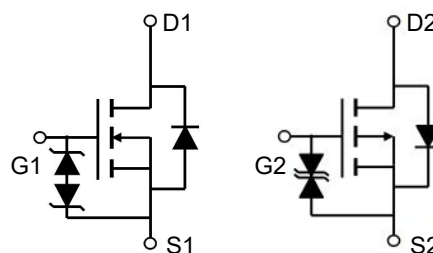
General Features

- NMOS
- V_{DS} 20V
- I_D (at $V_{GS} = 10V$) 1.3A
- $R_{DS(ON)}$ (at $V_{GS} = 4.5V$) < 210m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 2.5V$) < 270m Ω
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 2.0KV

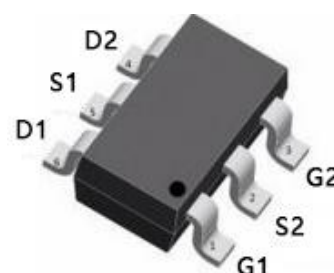
- PMOS
- V_{DS} -20V
- I_D (at $V_{GS} = -10V$) -1.1A
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 460m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -2.5V$) < 600m Ω
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 2.0KV

Application

- Power switch
- DC/DC converters



Schematic diagram



SOT-23-6L Dual

Ordering Information

Device	Package	Marking	Packaging
G1NP02LLE	SOT-23-6L Dual	G1NP02E	3000pcs/Reel

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

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	1.3	-1.1	A
	$T_C = 100^\circ\text{C}$	0.8	-0.7	
Pulsed Drain Current (note1)	I_{DM}	5.2	-4.4	A
Gate-Source Voltage	V_{GS}	± 10	± 10	V
Power Dissipation	P_D	1.25	1.25	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	-55 To 150	$^\circ\text{C}$

Thermal Resistance

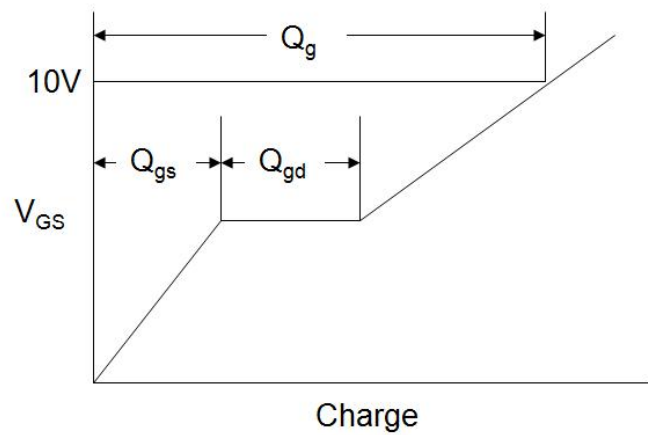
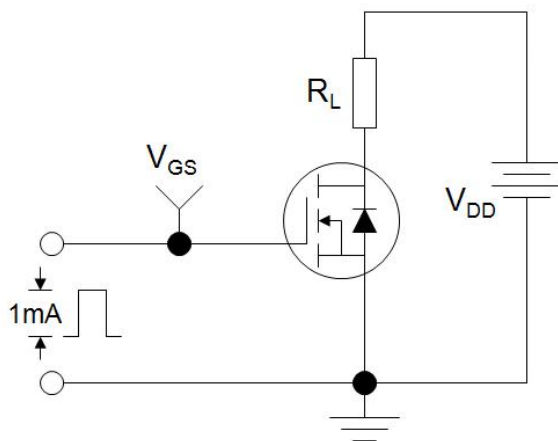
Parameter	Symbol	NMOS	PMOS	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	100	100	$^\circ\text{C/W}$

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	20	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20V, V _{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±10V	--	--	±10	uA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	0.35	0.7	1.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 4.5V, I _D = 0.65A	--	175	210	mΩ
		V _{GS} = 2.5V, I _D = 0.55A	--	230	270	
Forward Transconductance	g _{FS}	V _{GS} = 5V, I _D = 0.55A	--	1.3	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 10V, f = 1.0MHz	--	146	--	pF
Output Capacitance	C _{oss}		--	108	--	
Reverse Transfer Capacitance	C _{rss}		--	52	--	
Total Gate Charge	Q _g	V _{DD} = 10V, I _D = 0.65A, V _{GS} = 4.5V	--	1	--	nC
Gate-Source Charge	Q _{gs}		--	0.27	--	
Gate-Drain Charge	Q _{gd}		--	0.21	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10V, I _D = 0.65A, R _G = 10Ω	--	17.5	--	ns
Turn-on Rise Time	t _r		--	2.1	--	
Turn-off Delay Time	t _{d(off)}		--	9.5	--	
Turn-off Fall Time	t _f		--	22	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	1.3	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} =0.65A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 0.65A, V _{GS} = 0V di/dt=20A/us	--	0.39	--	nC
Reverse Recovery Time	T _{rr}		--	14	--	ns

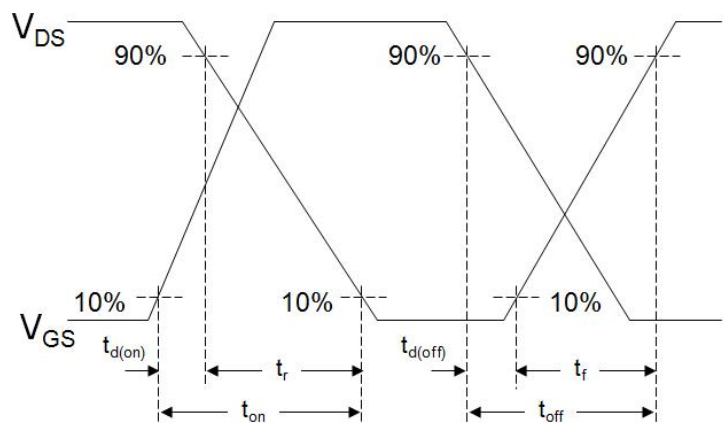
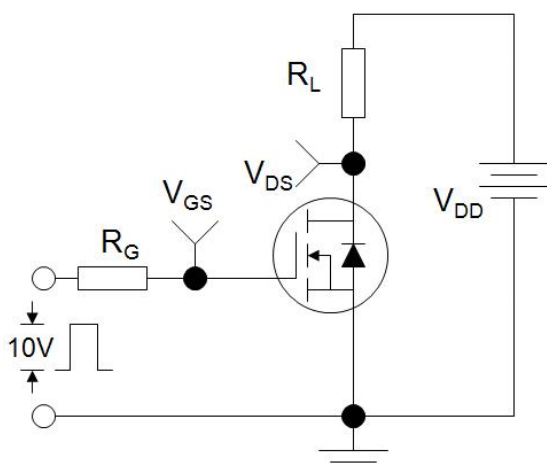
Notes

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

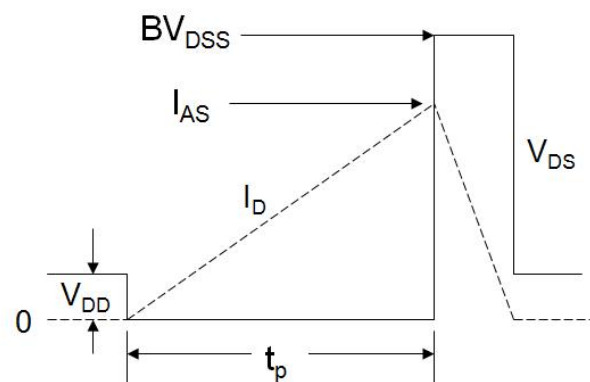
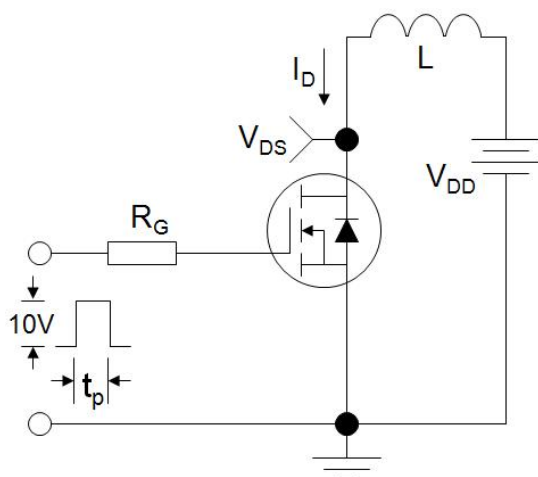
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

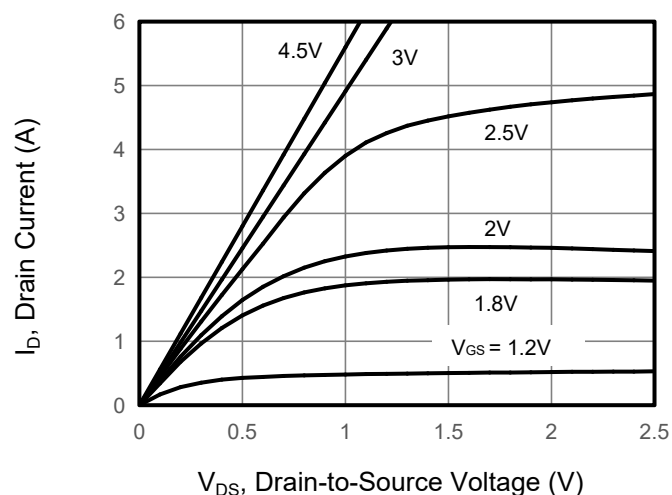


Figure 2. Transfer Characteristics

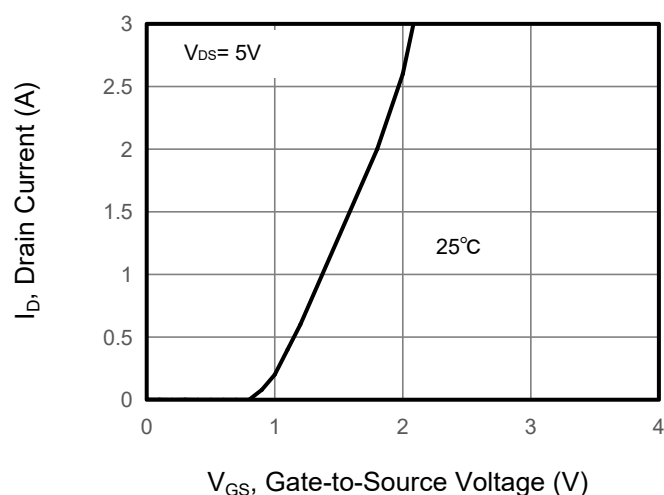


Figure 3. Drain Source On Resistance

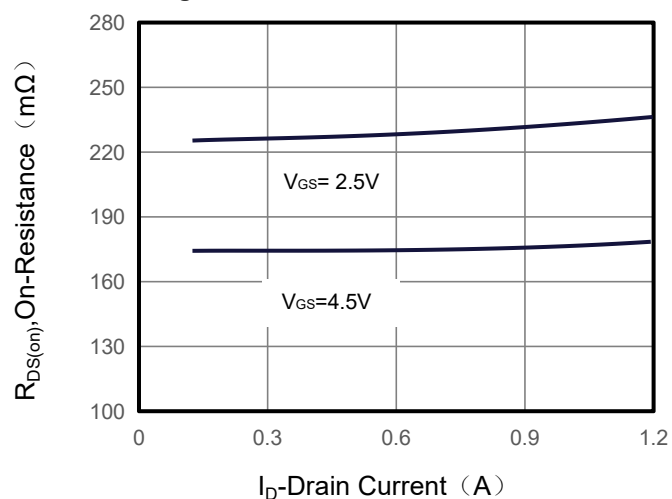


Figure 4. Gate Charge

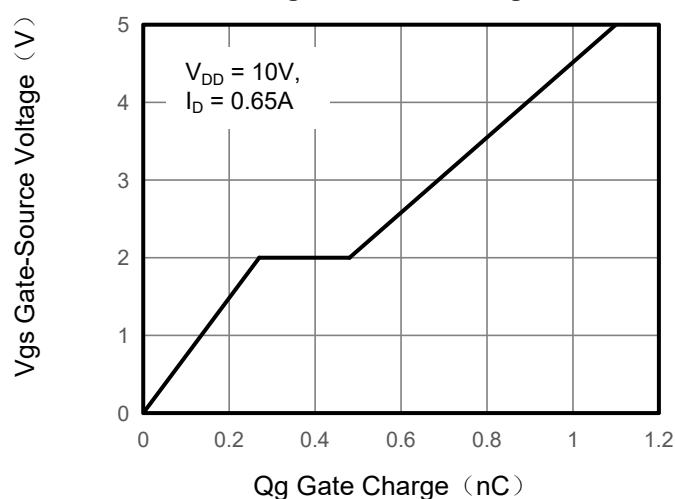


Figure 5. Capacitance

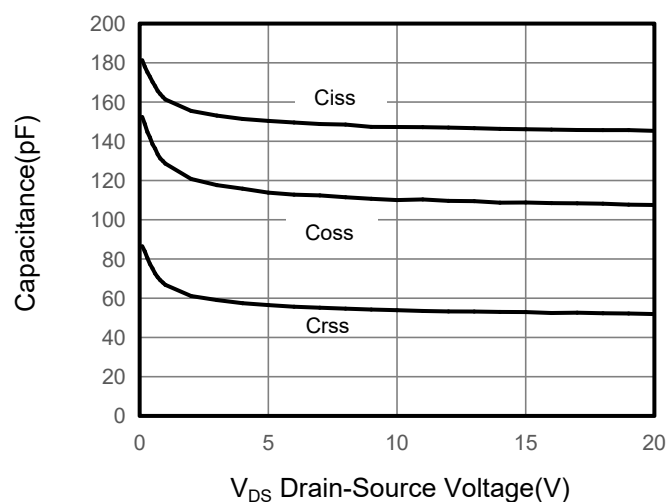
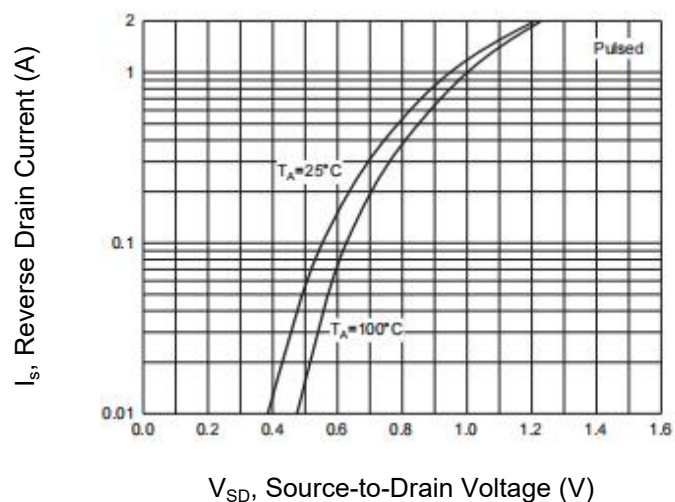


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

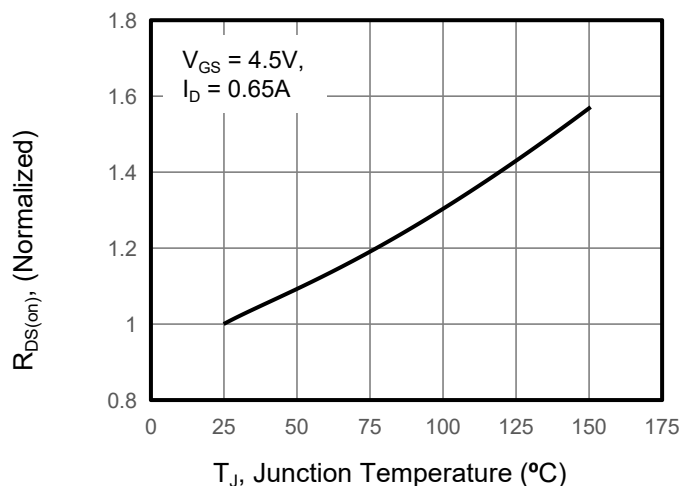


Figure 8. Safe Operation Area

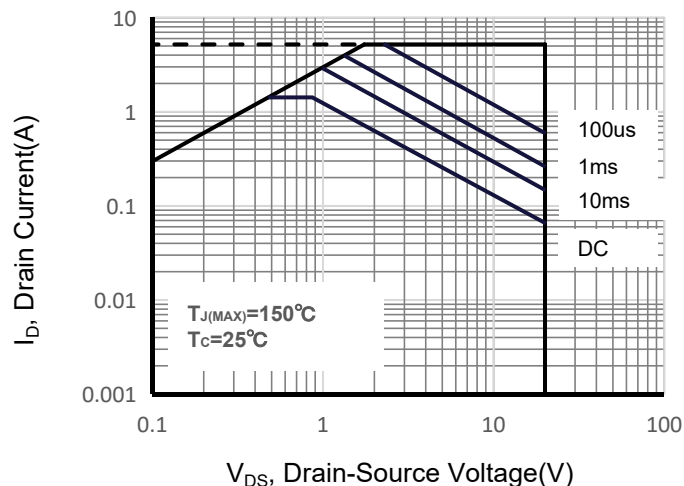


Figure 9. Maximum Continuous Drain Current vs Case Temperature

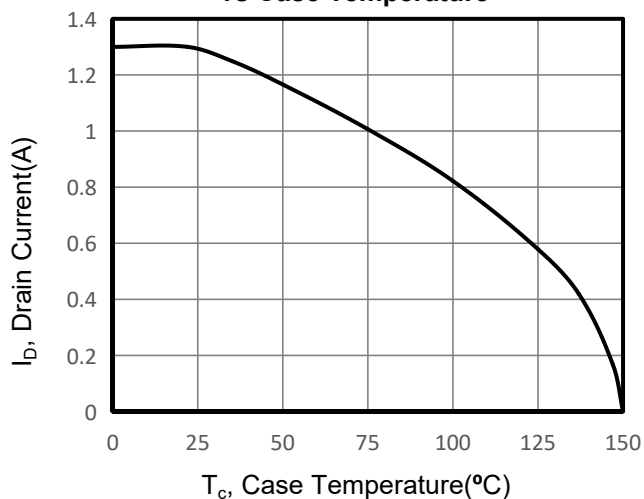
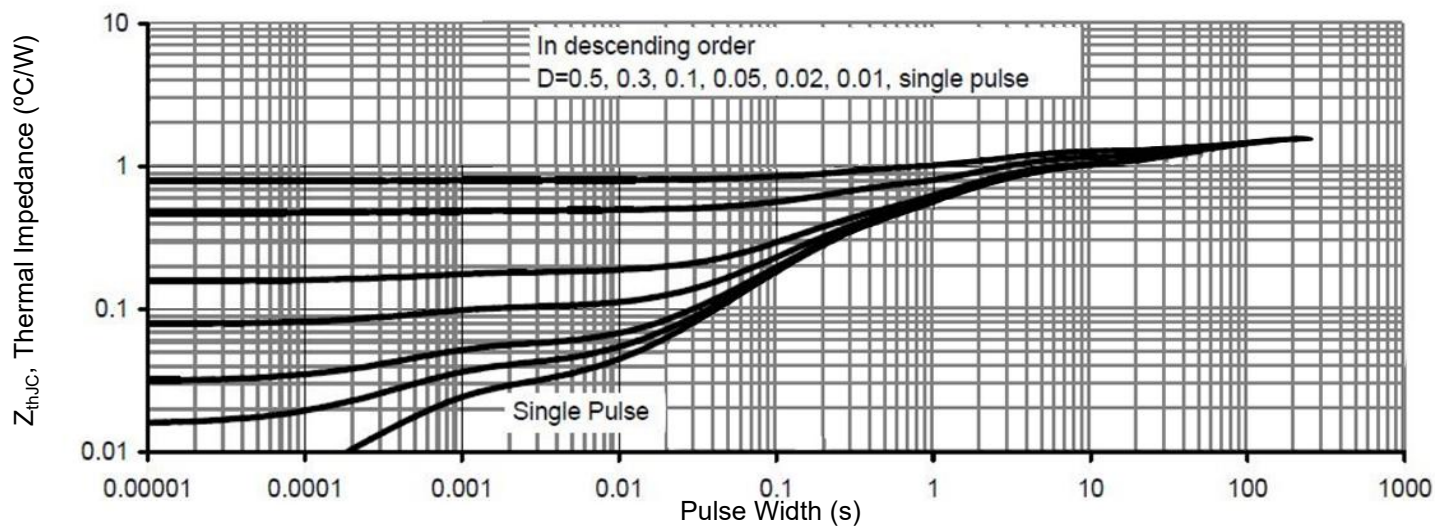


Figure 10. Normalized Maximum Transient Thermal Impedance

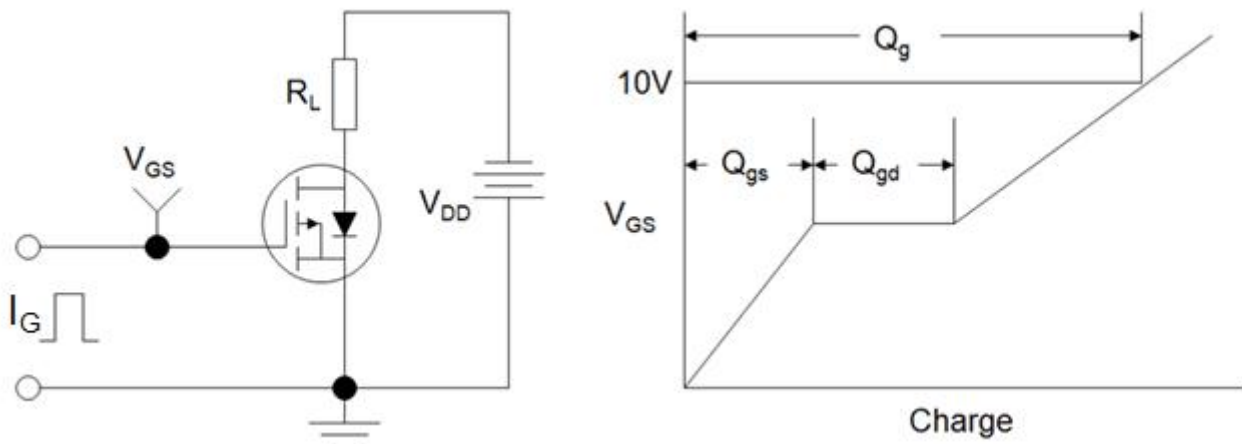


PMOS Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-20	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -20V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±10V	--	--	±10	uA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-0.35	-0.6	-0.8	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -4.5V, I _D = -0.5A	--	410	460	mΩ
		V _{GS} = -2.5V, I _D = -0.5A	--	570	600	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -0.5A	--	1.3	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -10V, f = 1.0MHz	--	177	--	pF
Output Capacitance	C _{oss}		--	109	--	
Reverse Transfer Capacitance	C _{rss}		--	51	--	
Total Gate Charge	Q _g	V _{DD} = -10V, I _D = -0.5A, V _{GS} = -4.5V	--	1.22	--	nC
Gate-Source Charge	Q _{gs}		--	0.36	--	
Gate-Drain Charge	Q _{gd}		--	0.26	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -10V, I _D = -0.5A, R _G = 3Ω	--	18	--	ns
Turn-on Rise Time	t _r		--	4.5	--	
Turn-off Delay Time	t _{d(off)}		--	23	--	
Turn-off Fall Time	t _f		--	15	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-1.1	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -0.5A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -0.5A, V _{GS} = 0V di/dt=-20A/us	--	0.95	--	nC
Reverse Recovery Time	T _{rr}		--	24	--	ns

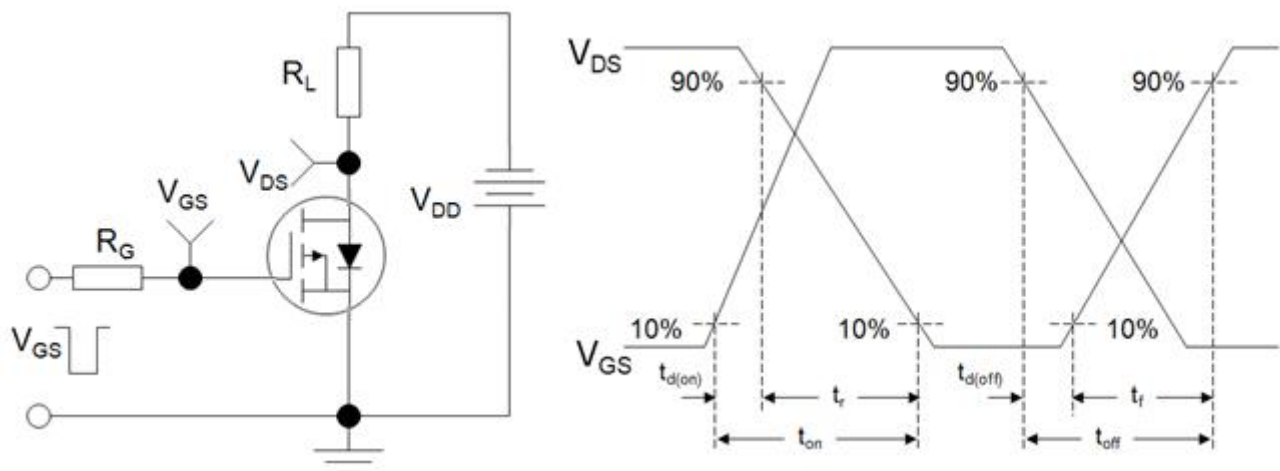
Notes

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

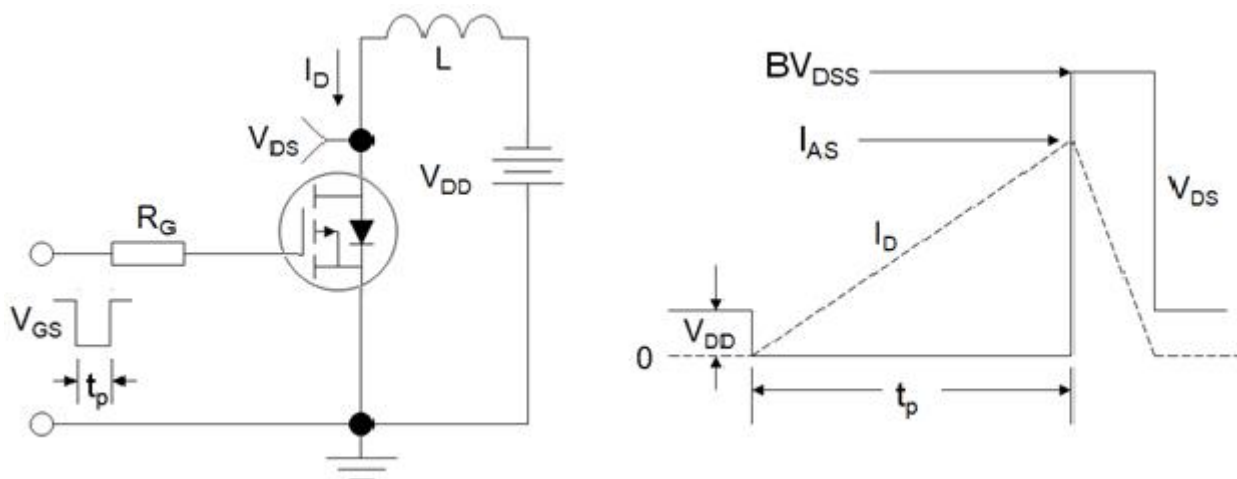
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

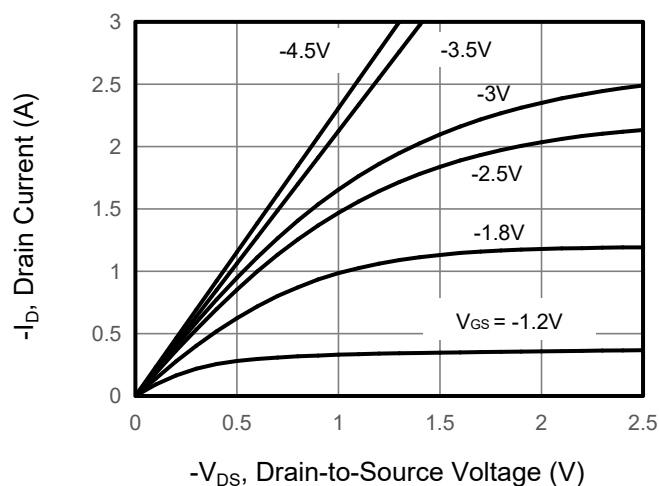


Figure 2. Transfer Characteristics

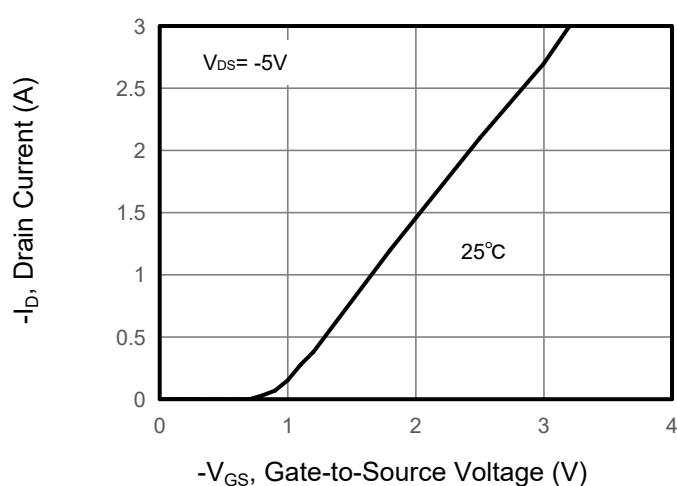


Figure 3. Drain Source On Resistance

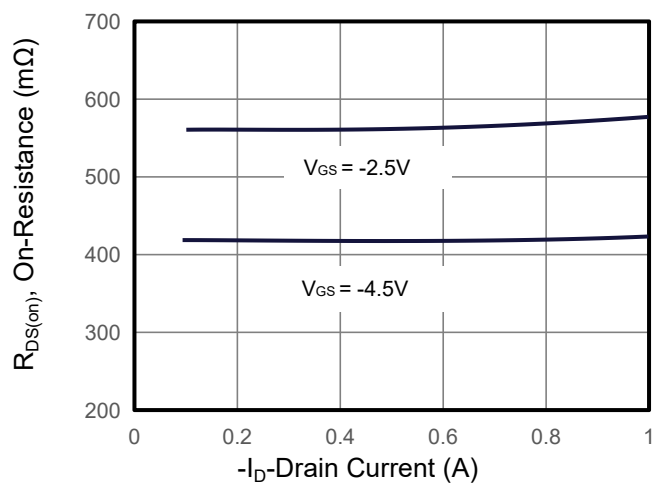


Figure 4. Gate Charge

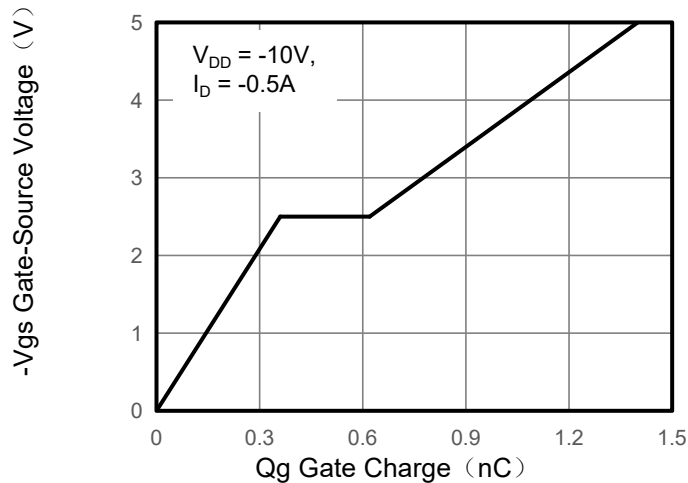


Figure 5. Capacitance

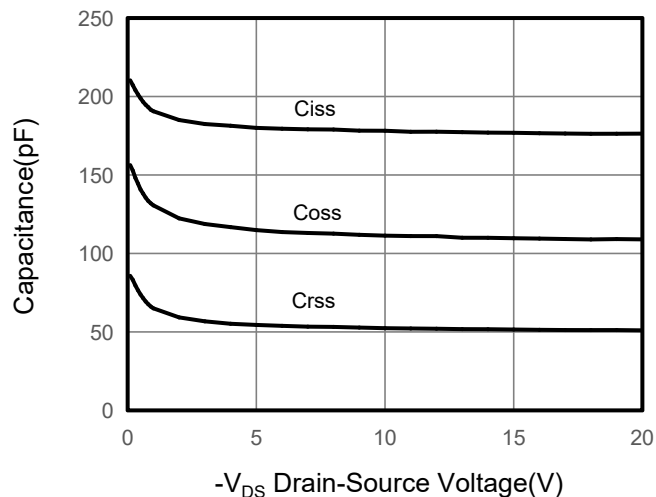
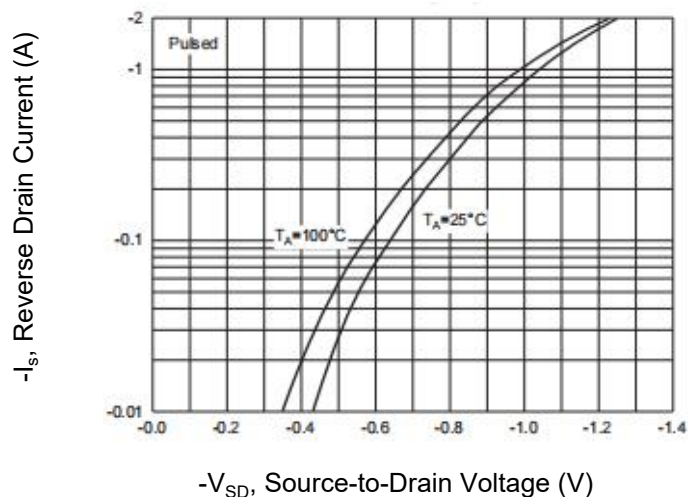


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

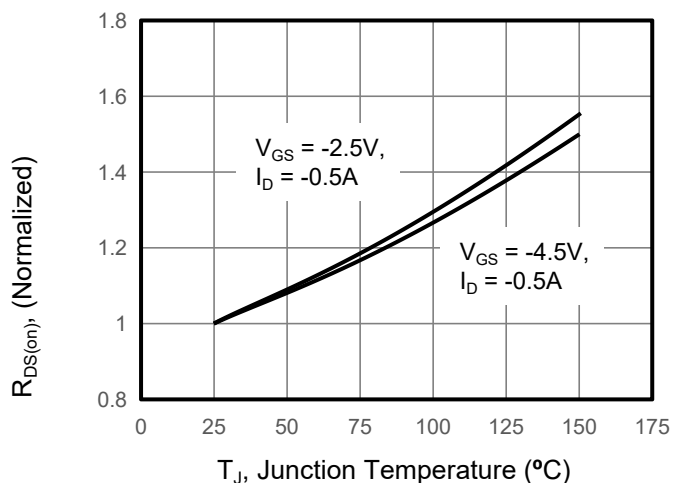


Figure 8. Safe Operation Area

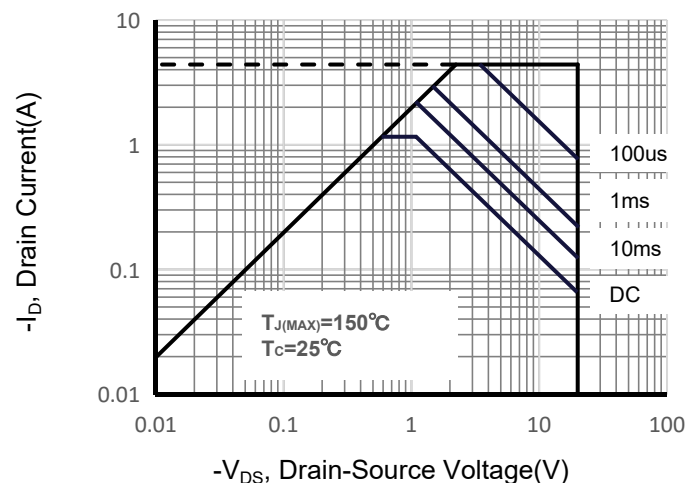


Figure 9. Maximum Continuous Drain Current vs Case Temperature

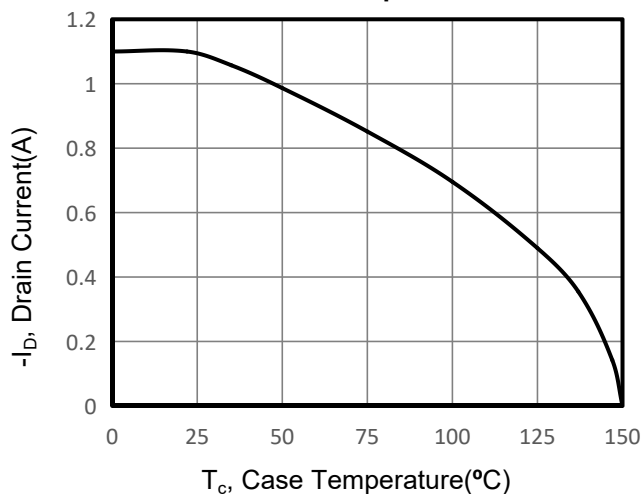
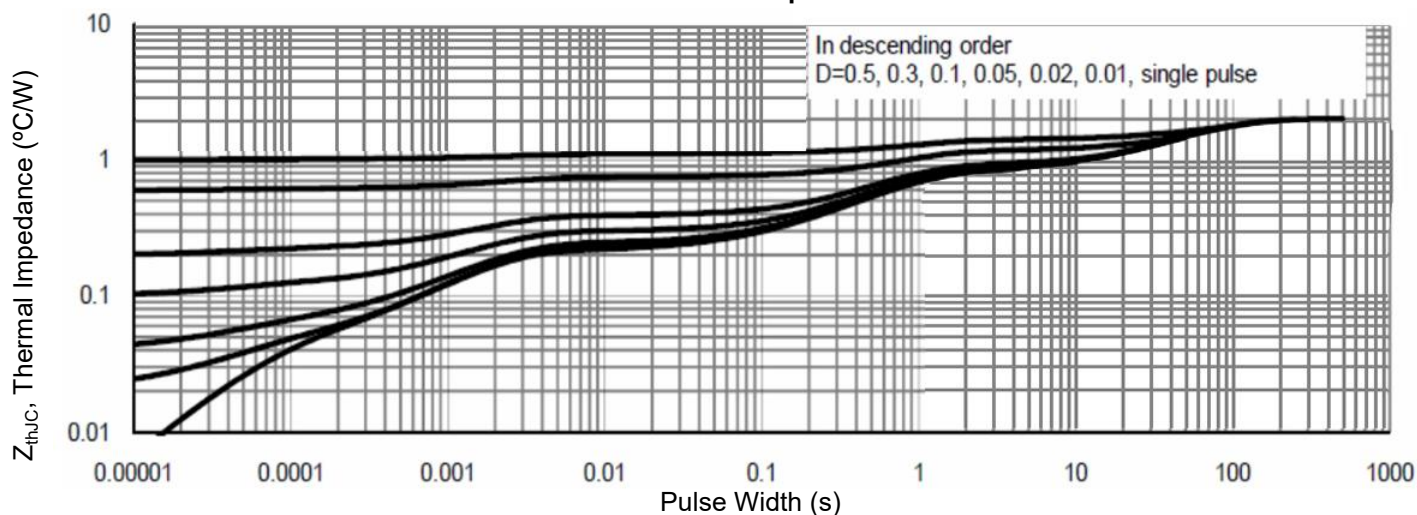
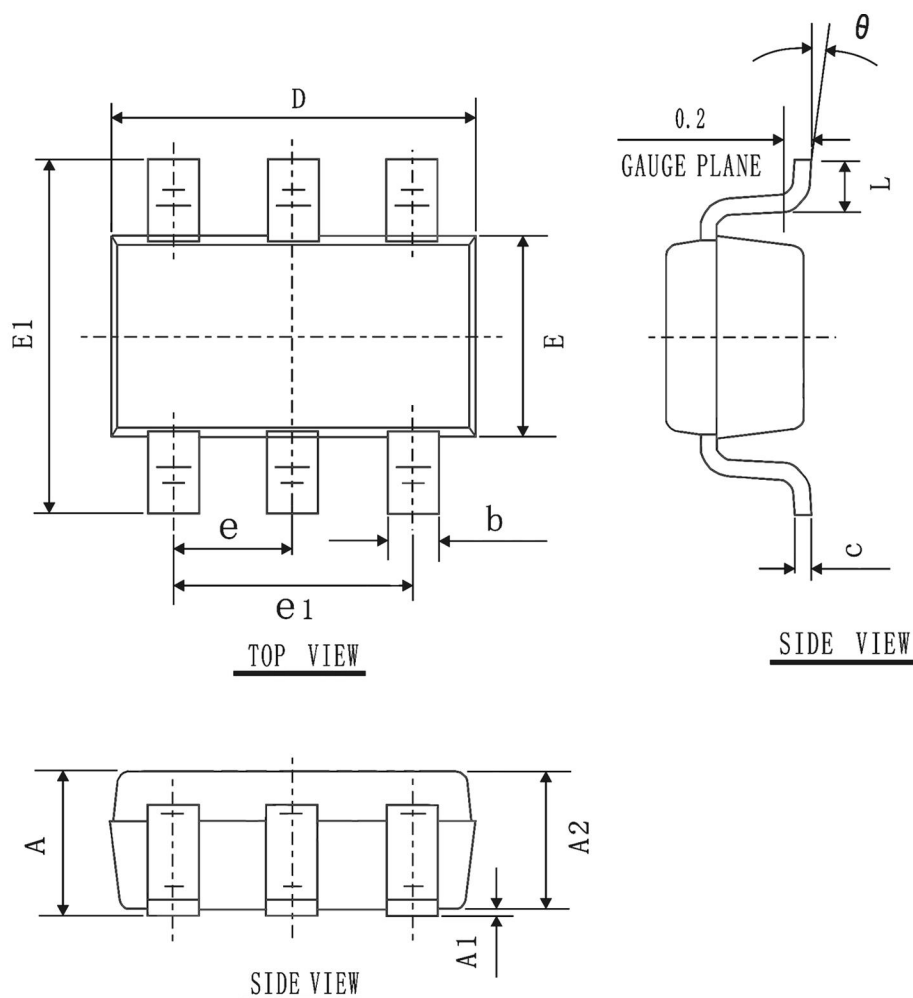


Figure 10. Normalized Maximum Transient Thermal Impedance



SOT-23-6L Dual Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	---	---	1.20
A1	0.00	0.05	0.10
A2	1.00	1.10	1.20
b	0.30	0.40	0.50
c	0.10	0.125	0.15
e1	1.80	1.90	2.00
D	2.80	2.90	3.00
E	1.50	1.60	1.70
E1	2.60	2.80	3.00
L	0.30	0.45	0.60
θ	0°	4°	8°
e	0.95BSC		