AG016NP060MSP

N and P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	20mΩ@10V	16A	-60V	40mΩ@-10V	-11A
	25mΩ@4.5V			60mΩ@-4.5V	

Feature

- Extremely low on-resistance
- High current capacity
- Fast switching speed

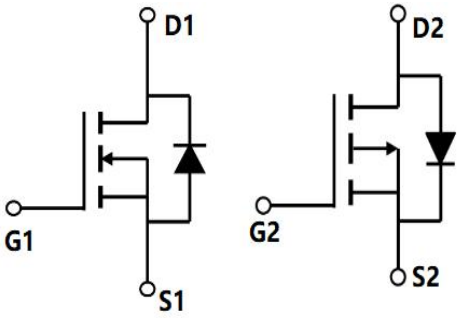
Application

- Synchronous rectification
- Motor control
- Portable equipment application

Package

SOP-8

Circuit diagram



Marking

AG016NP060MSP

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Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current (T_C =25℃)	I_D	16	-11	A
Continuous Drain Current[1)]	I_D	10	-7	A
Continuous Drain Current[1)] (T_A =100℃)	$I_{D(100℃)}$	6.3	-4.4	A
Pulsed Drain Current (t_p =10us)	I_{DM}	60	-50	A
Single Pulse Avalanche Energy[2)]	E_{AS}	35	45	mJ
Power Dissipation[1)]	P_D	3.1	3.1	W
Thermal Resistance Junction to Ambient[1)]	$R_{\theta JA}$	40	40	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	℃

N-CH Electrical characteristics (T_A=25 ºC, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =60V, V_{GS} =0V			1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.8	2.5	V
Drain-source on-resistance[3)]	$R_{DS(on)}$	V_{GS} =10V, I_D =10A		15	20	mΩ
		V_{GS} =4.5V, I_D =10A		20	25	
Dynamic characteristics[4)]						
Input Capacitance	C_{iss}	V_{DS} =30V, V_{GS} =0V, f =1MHz		677		pF
Output Capacitance	C_{oss}			160		
Reverse Transfer Capacitance	C_{rss}			7		
Total Gate Charge	Q_g	V_{DS} =30V, V_{GS}=10V, I_D =10A		12.7		nC
Gate-Source Charge	Q_{gs}			1.8		
Gate-Drain Charge	Q_{gd}			3.2		
Turn-on delay time	$t_{d(on)}$	V_{DS} =30V, V_{GS} =15V, I_D =10A R_G =3.3Ω		7		nS
Turn-on rise time	t_r			35		
Turn-off delay time	$t_{d(off)}$			22		
Turn-off fall time	t_f			24		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				16	A
Diode Forward voltage[3)]	V_{SD}	V_{GS} =0V, I_S =10A			1.2	V
Reverse recover time	T_{rr}	V_{GS} =0V, I_F =10A di/dt =-100A/us		26		nS
Reverse recovery charge	Q_{rr}			15		nC

P-CH Electrical characteristics (T_A=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =-250μA	-60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-60V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.5	-2.5	V
Drain-source on-resistance[3]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-5A		32	40	mΩ
		V_{GS} =-4.5V, I_D =-4A		40	60	
Dynamic characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =-30V, V_{GS} =0V, f =1MHz		1902		pF
Output Capacitance	C_{oss}			104		
Reverse Transfer Capacitance	C_{rss}			83		
Total Gate Charge	Q_g	V_{DS} =-30V, V_{GS}=-10V I_D =-5A		37		nC
Gate-Source Charge	Q_{gs}			5.5		
Gate-Drain Charge	Q_{gd}			6		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-30V, V_{GS} =-10V I_D =-5A, R_G =3Ω		4.3		nS
Turn-on rise time	t_r			6.3		
Turn-off delay time	$t_{d(off)}$			46.7		
Turn-off fall time	t_f			25.3		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-11	A
Diode Forward voltage[3]	V_{SD}	V_{GS} =0V, I_S=-5A			-1.2	V
Reverse recover time	T_{rr}	V_{GS} =0V, I_F =-5A di/dt =-100A/us		28		nS
Reverse recovery charge	Q_{rr}			17		nC

Notes:

1) The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2) The EAS data shows Max. rating. The test condition is N-Channel: V_{DD} = 30V, V_{GS} = 10V, L =0.5mH; P-Channel: V_{DD} = -30V, V_{GS} = -10V, L =0.5mH.

3) The data tested by pulsed, pulse width ≤300us, duty cycle ≤2%.

4) Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

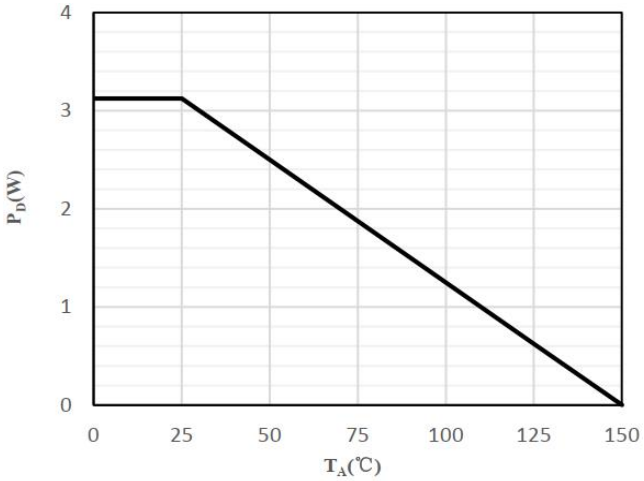


Fig 1 Power Dissipation

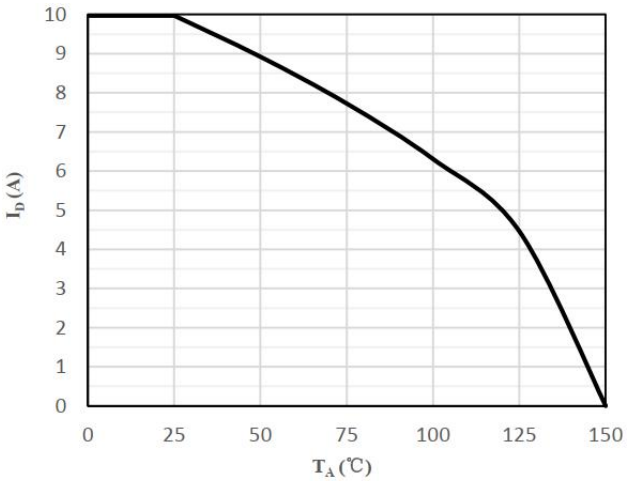


Fig 2 Drain Current

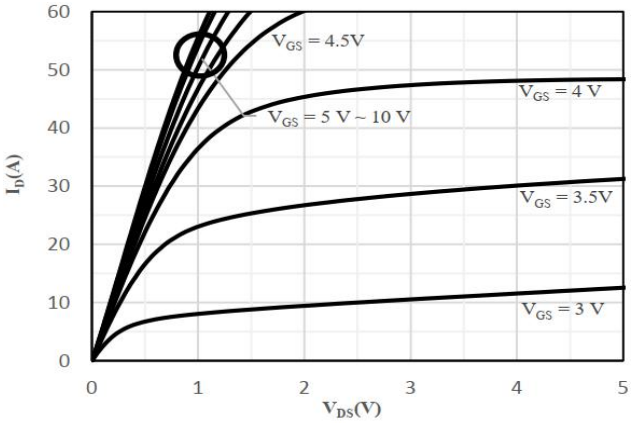


Fig 3 Typical Output Characteristics

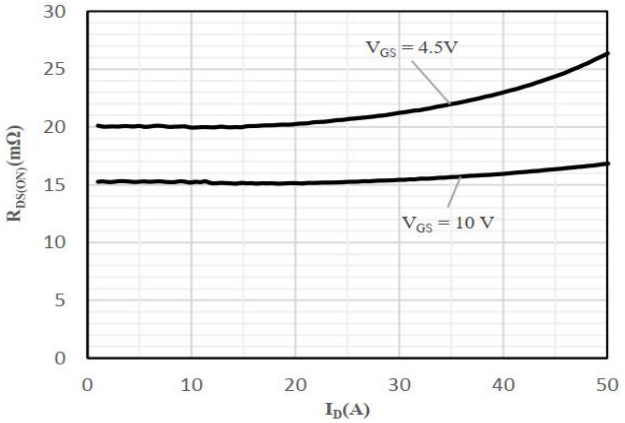


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

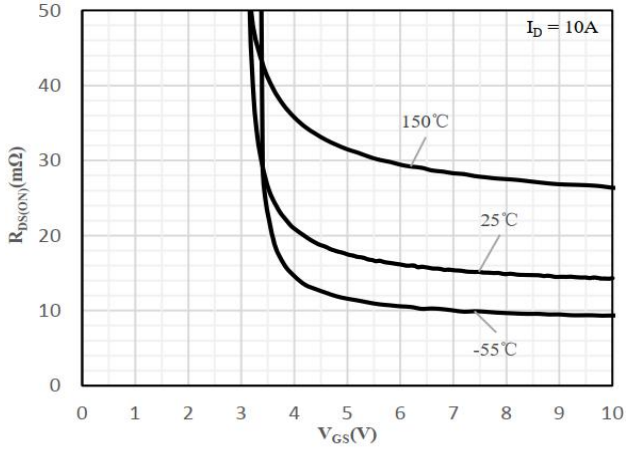


Fig 5 On-Resistance vs. Gate-Source Voltage

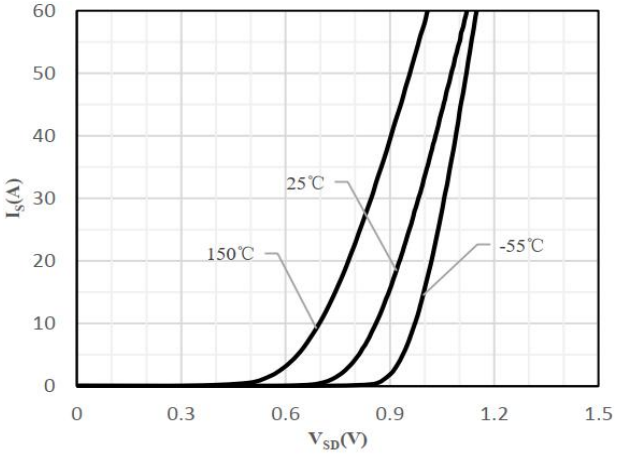


Fig 6 Body-Diode Characteristics

N-Channel Typical Characteristics

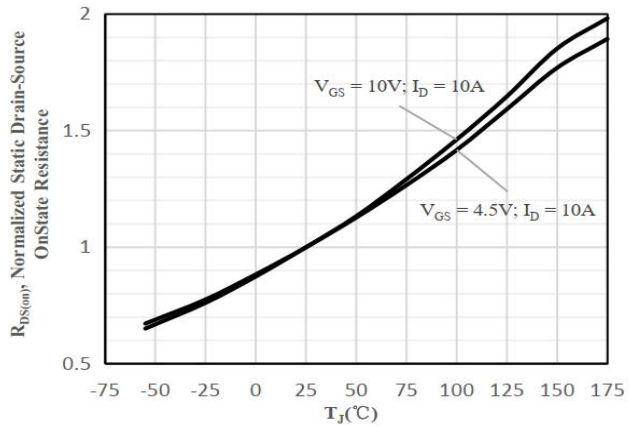


Fig 7 Normalized On-Resistance vs. Junction Temperature

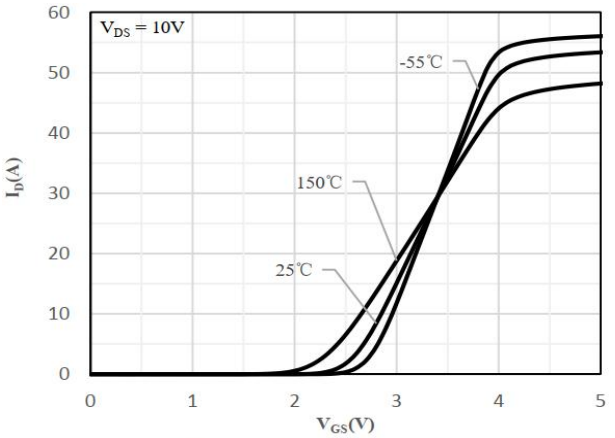


Fig 8 Transfer Characteristics

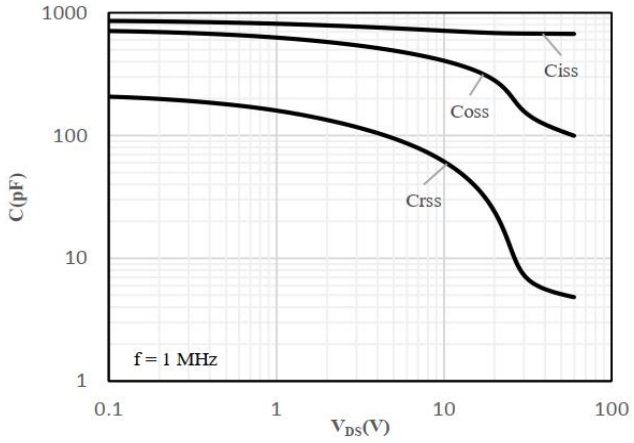


Fig 9 Capacitance Characteristics

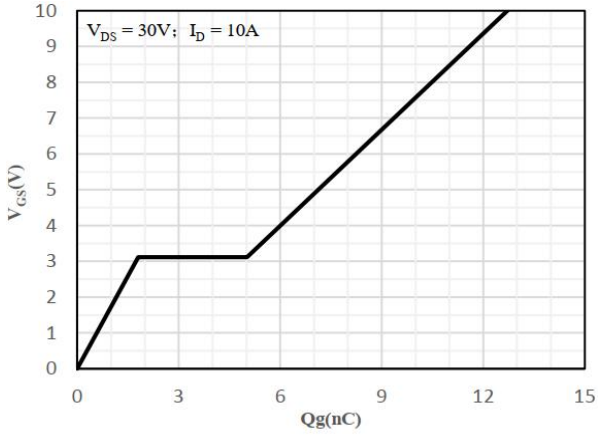


Fig 10 Gate-Charge Characteristics

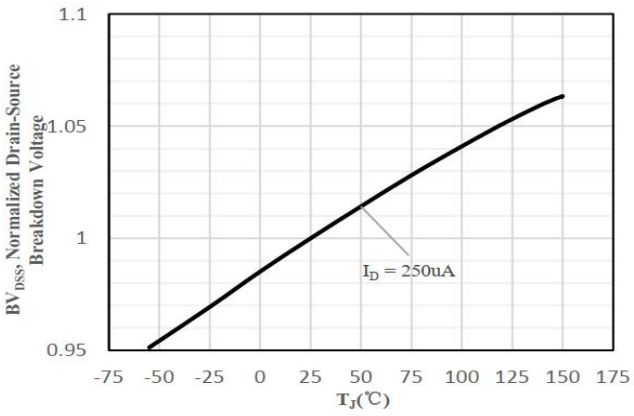


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

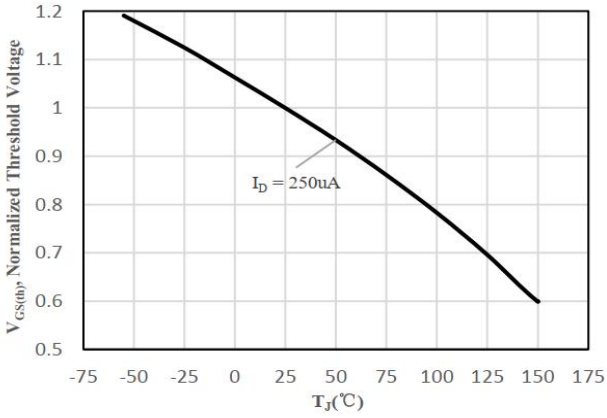


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

P-Channel Typical Characteristics

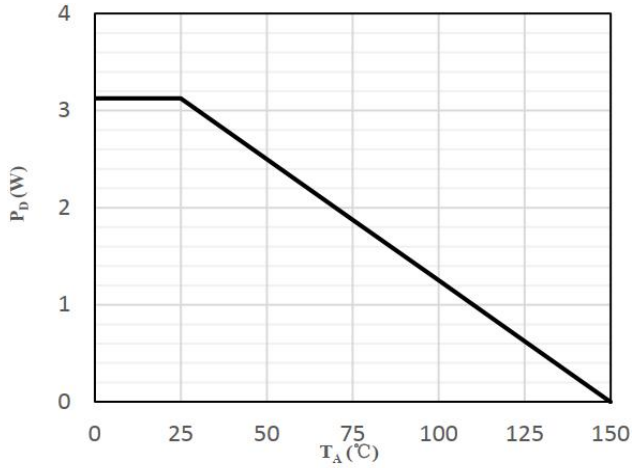


Fig 1 Power Dissipation

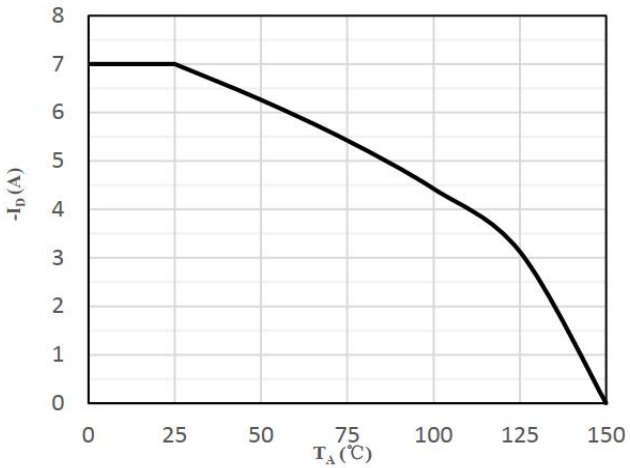


Fig 2 Drain Current

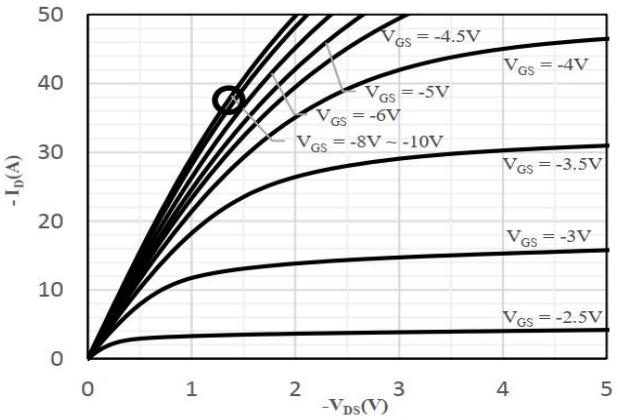


Fig 3 Typical Output Characteristics

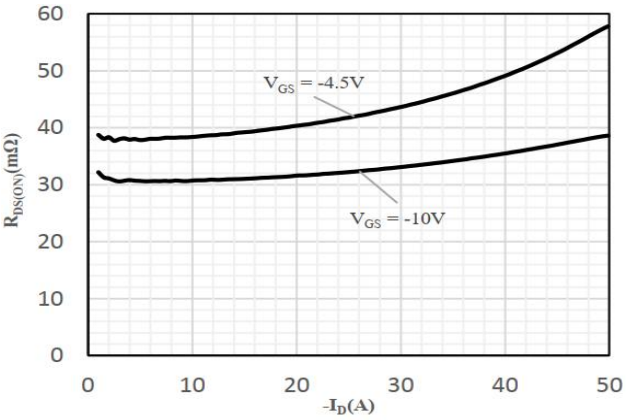


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

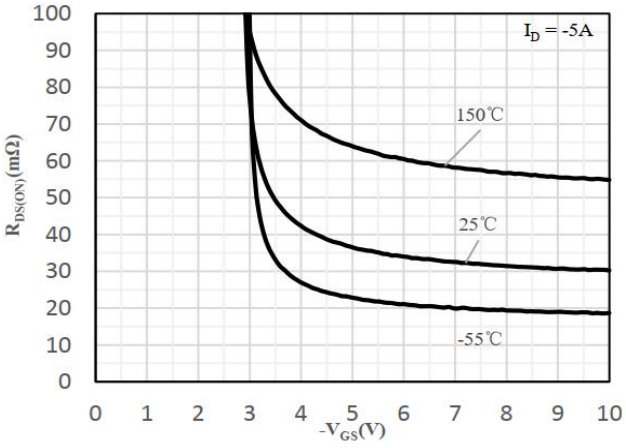


Fig 5 On-Resistance vs. Gate-Source Voltage

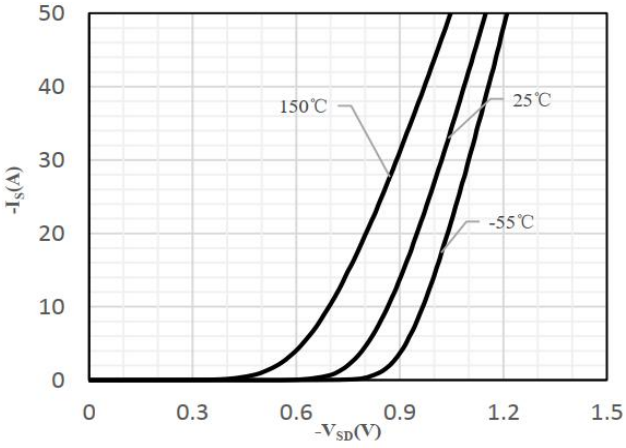


Fig 6 Body-Diode Characteristics

P-Channel Typical Characteristics

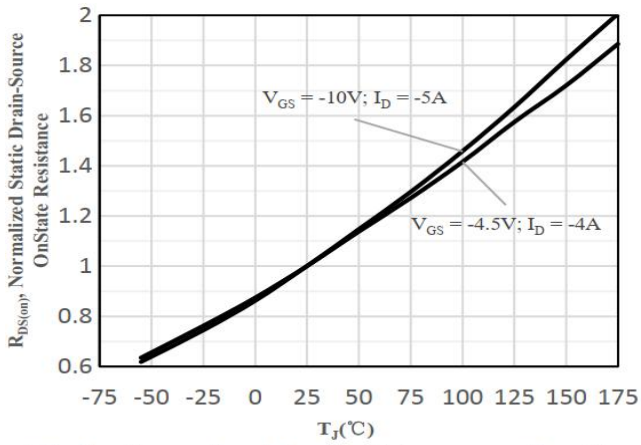


Fig 7 Normalized On-Resistance vs. Junction Temperature

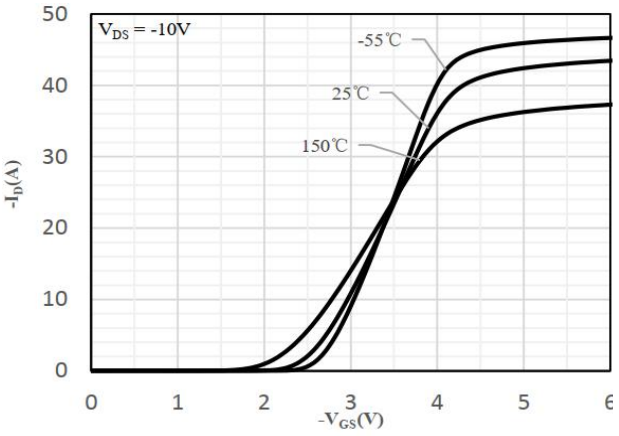


Fig 8 Transfer Characteristics

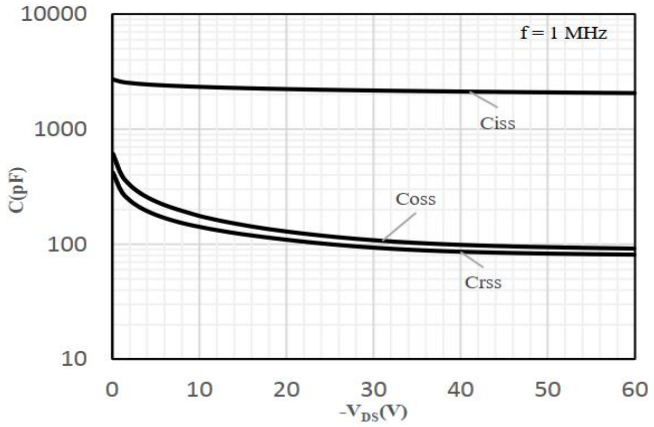


Fig 9 Capacitance Characteristics

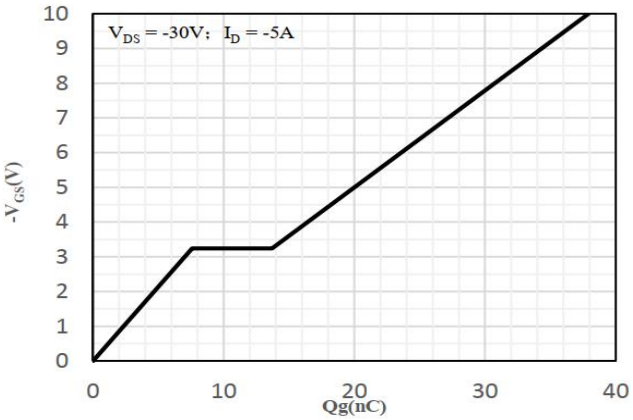


Fig 10 Gate-Charge Characteristics

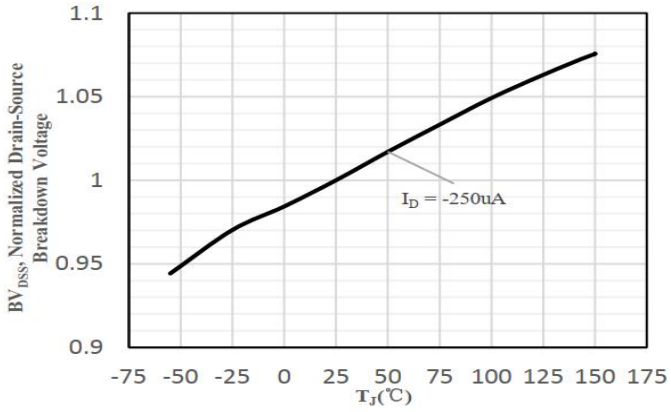


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

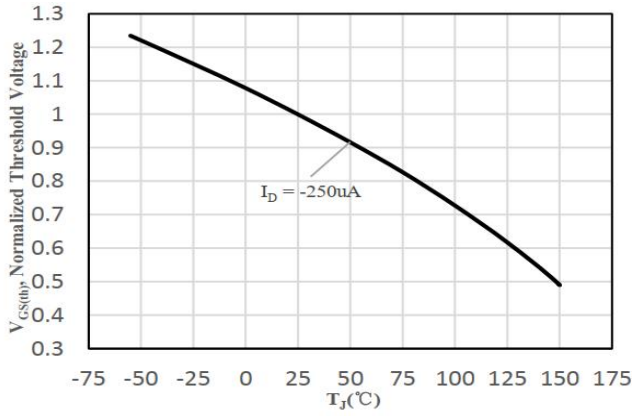
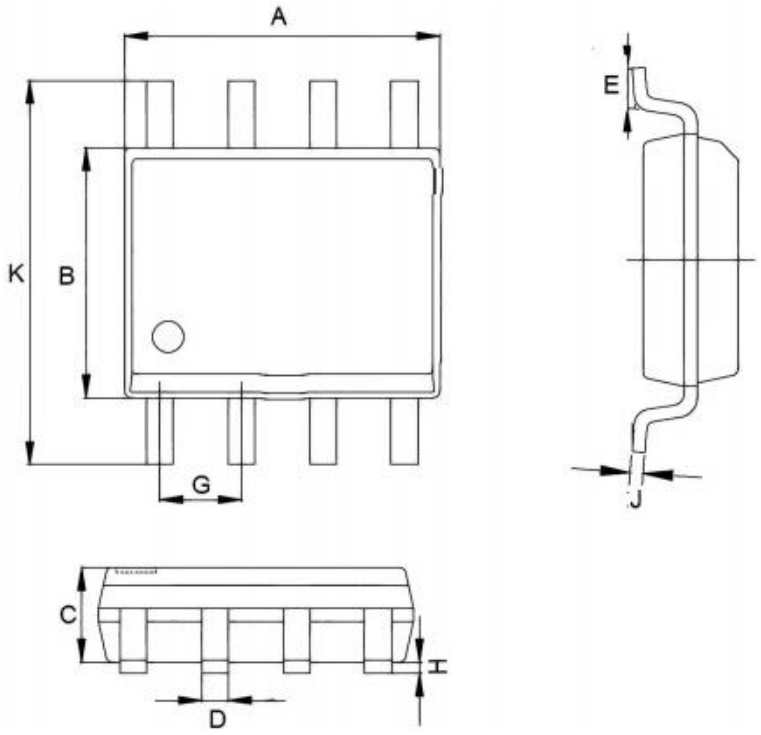


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.200	0.189	0.205
B	3.800	4.200	0.150	0.165
C	1.300	1.500	0.051	0.059
D	0.300	0.500	0.012	0.020
E	0.400	1.000	0.016	0.039
G	1.170	1.370	0.046	0.054
H	0.100	0.300	0.004	0.012
J	0.100	0.300	0.004	0.012
K	5.800	6.200	0.228	0.244