



# S8MBG052



## 60V N+P Dual Channel MOSFETs

### General Description

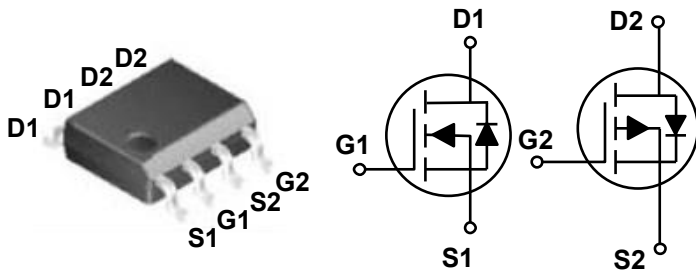
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
60 V	52 mΩ	5.1 A
-60 V	100 mΩ	-3.6 A

### Features

- Fast Switching
- Green Device Available

SOP-8 Pin Configuration



### Applications

- Wireless Charging
- Boost Driver
- Brushless Motor

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

Symbol	Parameter	Rating		Units
$V_{DS}$	Drain-Source Voltage	60	-60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_A=25^\circ\text{C}$ )	5.1	-3.6	A
$I_{DM}$	Drain Current - Pulsed (NOTE 1)	20	-14	A
$P_D$	Power Dissipation ( $T_A=25^\circ\text{C}$ )	1.47		W
$T_J$	Operating Junction Temperature Range	-55 to 150		$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
Marking Code		BG052, AP8G06S		

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	85	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	62.5	$^\circ\text{C/W}$

**60V N+P Dual Channel MOSFETs****N Channel Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	60	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =5A	---	---	52	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	---	---	75	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	---	2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =4A	---	28	---	S

**Dynamic and Switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =48V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	---	19	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.6	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =4A	---	3	---	nS
T <sub>r</sub>	Rise Time		---	34	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	23	---	
T <sub>f</sub>	Fall Time		---	6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1MHz	---	1027	---	pF
C <sub>oss</sub>	Output Capacitance		---	65	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	45	---	

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	2.5	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1.2	V

**NOTES :**

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



# 60V N+P Dual Channel MOSFETs

## Characteristics Curves

FIG. 1-Forward Characteristics of Body Diode

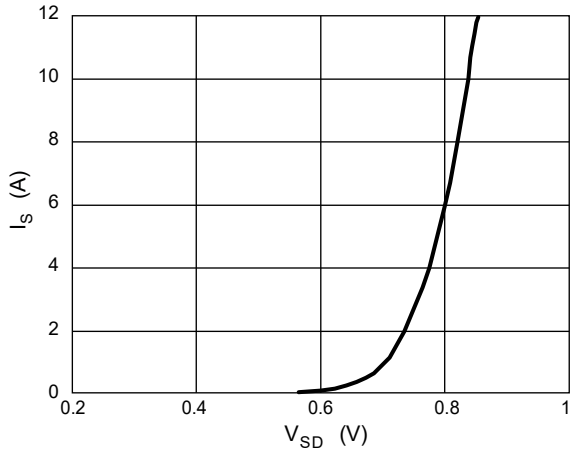


FIG. 2-Normalized V<sub>GS(th)</sub> vs T<sub>J</sub>

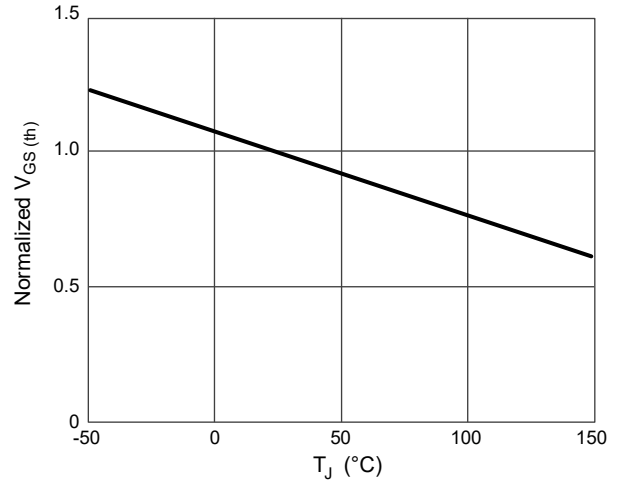


FIG. 2-Normalized R<sub>DS(on)</sub> vs T<sub>J</sub>

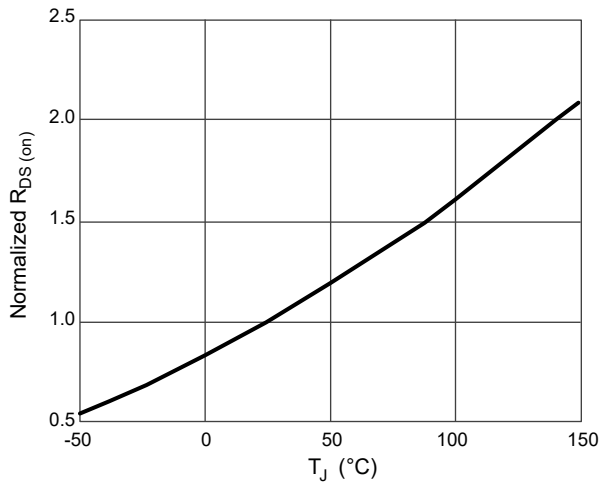


FIG. 4-R<sub>DS(on)</sub> vs V<sub>GS</sub>

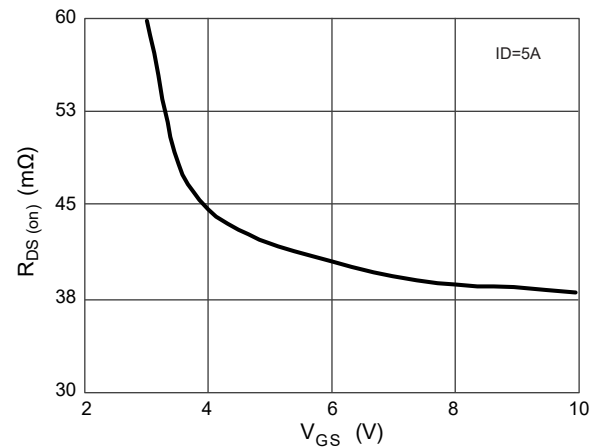


FIG. 5-Safe Operation Area

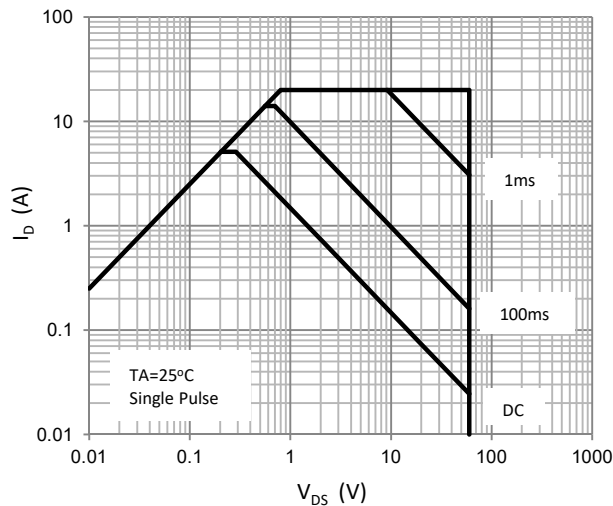
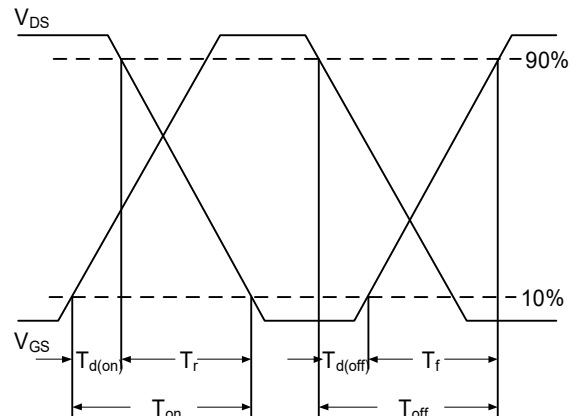


FIG. 6-Switching Time Waveform



**60V N+P Dual Channel MOSFETs****P Channel Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V , I <sub>D</sub> = -250uA	-60	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = -48V , V <sub>GS</sub> = 0V	---	---	-1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> = 0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10V , I <sub>D</sub> = -3A	---	---	100	mΩ
		V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -2A	---	---	105	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> = -250uA	-1.2	---	-2.5	V
gfs	Forward Transconductance	V <sub>DS</sub> = -5V , I <sub>D</sub> = -3A	---	8.5	---	S

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -48V , V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -3A	---	12.1	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	6.3	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -15V , V <sub>GS</sub> = -10V , R <sub>G</sub> = 3.3Ω , I <sub>D</sub> = -1A	---	9.2	---	nS
T <sub>r</sub>	Rise Time		---	20.1	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	46.7	---	
T <sub>f</sub>	Fall Time		---	9.4	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V , V <sub>GS</sub> = 0V , F= 1MHz	---	1137	---	pF
C <sub>oss</sub>	Output Capacitance		---	76	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	50	---	

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-2.5	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V , I <sub>S</sub> = -1A	---	---	-1.2	V

## NOTES :

- The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
- Essentially independent of operating temperature.



Characteristics Curves

FIG. 7-Forward Characteristics of Body Diode

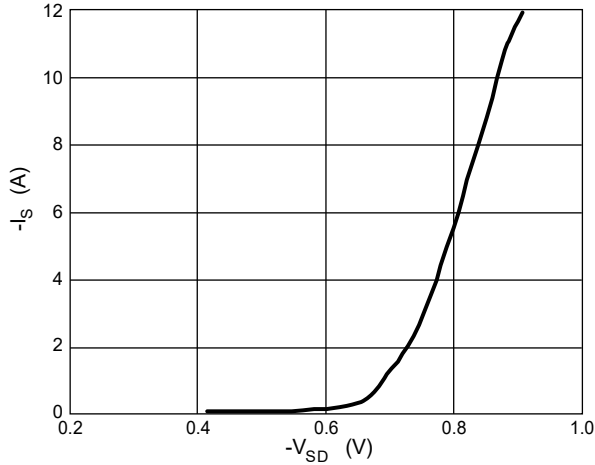


FIG. 8-Normalized VGS(th) vs TJ

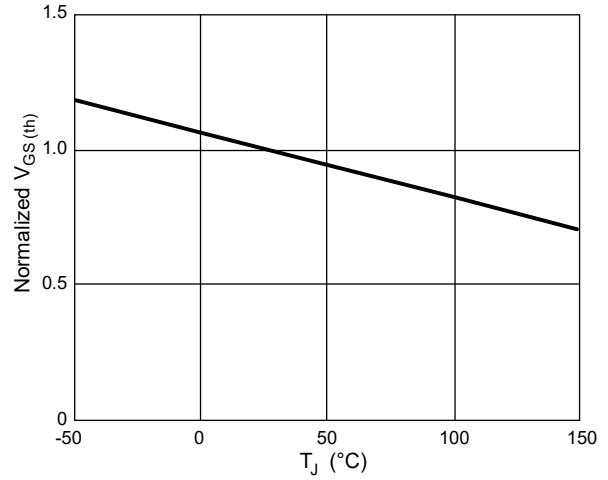


FIG. 9-Normalized RDS(on) vs TJ

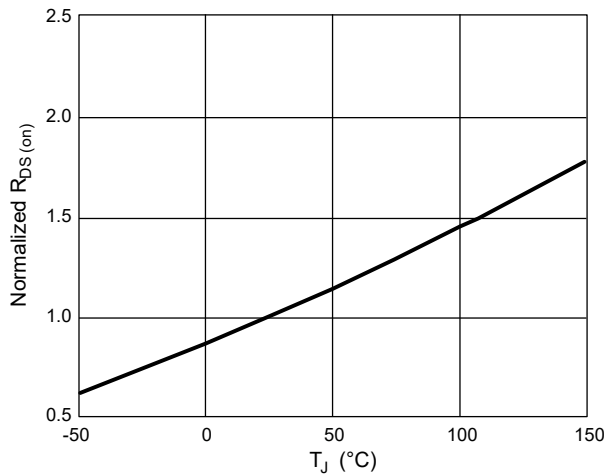


FIG. 10-Gate Charge Characteristics

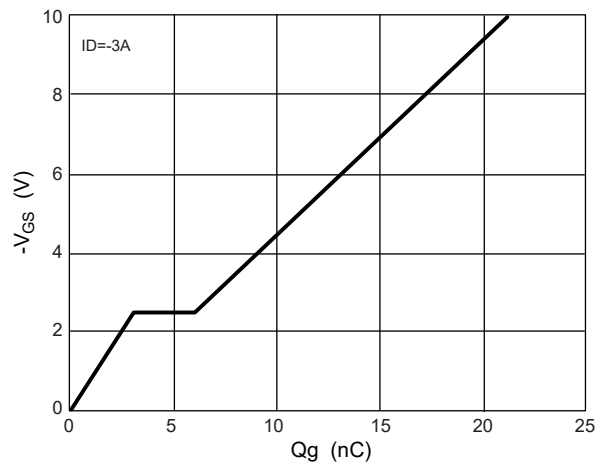


FIG. 11-Safe Operation Area

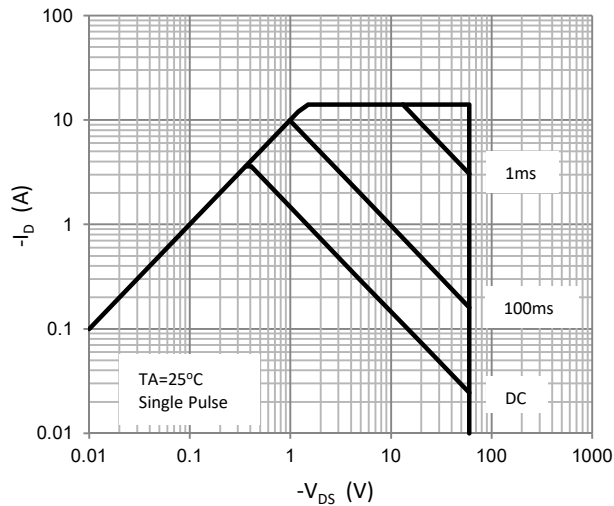
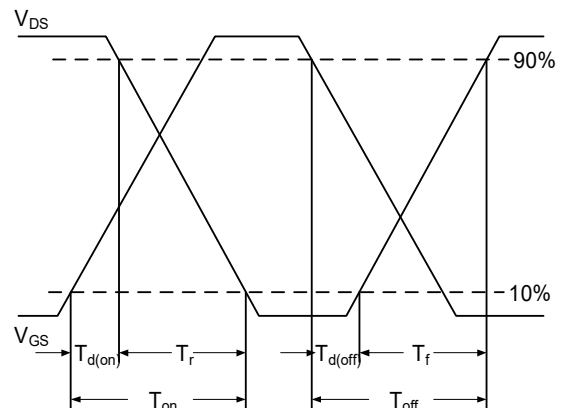


FIG. 12-Switching Time Waveform



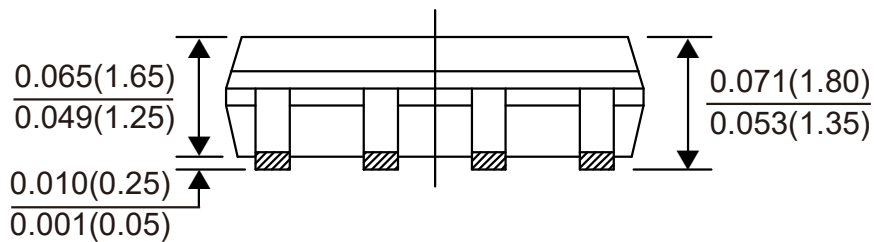
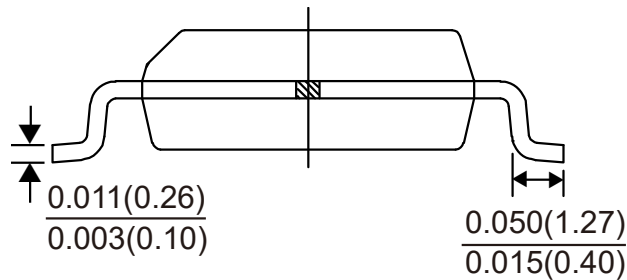
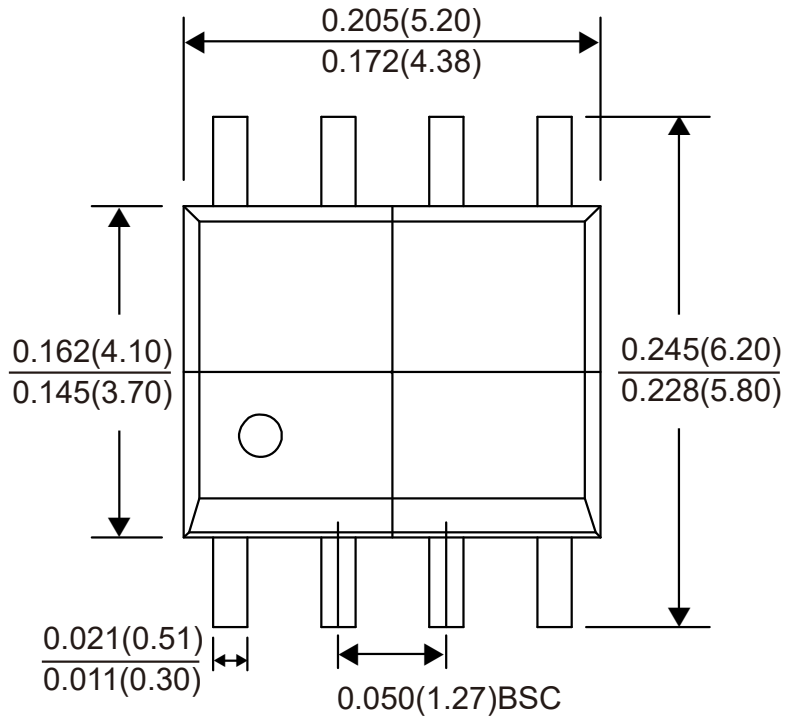


**S8MBG052**



**60V N+P Dual Channel MOSFETs**

**Package Outline Dimensions**



**SOP-8**

Dimensions in inches and (millimeters)



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