

V_{DSS} , -30V R_{DS(ON)} , 58mΩ (max.) @ V_{GS}=-10V R_{DS(ON)} , 95mΩ (max.) @ V_{GS}=-4.5V I_D , -3.9A	SOP-8	

Description	Features
<p>The SGP3060S is the highest performance trench P-Ch MOSFETs with extreme high cell density, which provide excellent R_{DS(ON)} and gate charge for most of the synchronous buck converter applications.</p> <p>The SGP3060S meet the RoHS and Green Product requirement, with full function reliability approved.</p>	<ul style="list-style-type: none"> • Low On-Resistance • Low Input Capacitance • Low Miller Charge • Fast Switching Speed
	Applications
	<ul style="list-style-type: none"> • Motor / Body Load Control • Automotive Systems • Load Switch • DC-DC converters

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SGP3060S	Halogen-Free	SOP-8	S	Tape & Reel	3,000

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current-Continuous	$T_A=25^{\circ}\text{C}$	I_D	-3.9	A
	$T_A=75^{\circ}\text{C}$		-3.0	A
Drain Current-Pulsed ^{Note 1}		I_{DM}	-17	A
Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	1.3	W
	$T_A=75^{\circ}\text{C}$		0.8	W
Storage Temperature Range		T_{STG}	-55 to +150	$^{\circ}\text{C}$
Operating Junction Temperature Range		T_J	-55 to +150	$^{\circ}\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{Note 2}	R _{θJA}	Steady State	-	-	100	°C/W
Maximum Junction-to-Case	R _{θJC}	Steady State	-	-	40	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _{DS} =-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-24V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.1	-	-2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _{DS} =-3.9A	-	-	58	mΩ
		V _{GS} =-4.5V, I _{DS} =-3A	-	-	95	mΩ
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	10	20	Ω
Forward Transconductance ^{Note 1}	g _{fs}	V _{DS} =-5V, I _D =-4.2A	-	4.8	-	S

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, f=1MHz	-	459	-	pF
Output Capacitance	C _{oss}		-	64	-	
Reverse Transfer Capacitance	C _{rss}		-	42	-	

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T _{d(on)}	V _{DD} =-15V, V _{GS} =-10V, R _G =3Ω, I _D =-1A	-	3.32	-	ns
Rise Time	t _r		-	17.8	-	
Turn-Off Delay Time	T _{d(off)}		-	19.8	-	
Fall Time	t _f		-	20.5	-	
Total Gate Charge at 10V	Q _g	V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3.9A	-	3.8	-	nC
Gate to Source Gate Charge	Q _{gs}		-	1.9	-	
Gate to Drain "Miller" Charge	Q _{gd}		-	1.1	-	

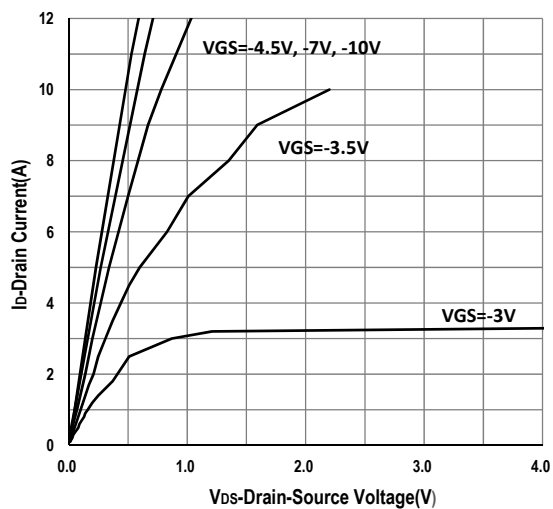
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-1A	-	-	-1.2	V
Body Diode Reverse Recovery Time	t _{rr}	V _{DD} =-15V, I _F =-3.9A, di/dt=100A/μs	-	12.5	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	4.7	-	nC

Notes:

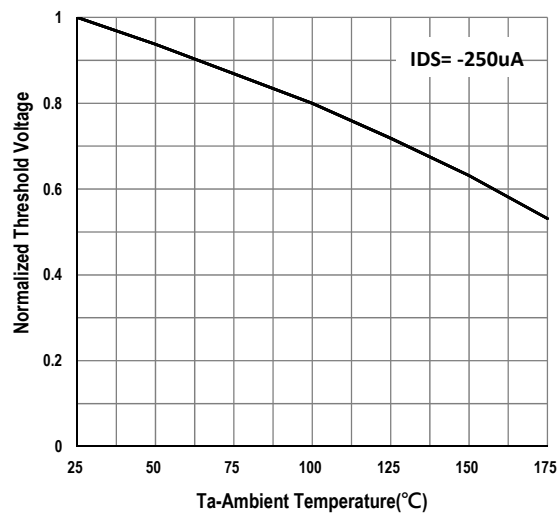
1. Pulse Test: Pulse Width ≤ 10ms, Duty Cycle ≤ 1%.
2. For surface-mounted devices, both R_{θCA} and R_{θJC} are measured with the device mounted on approximately 1"×1" FR-4 PCBs. In actual applications, many factors including the PCB material and layout, may affect the thermal resistance of the device-board assembly. For best results, characterize the thermal resistance directly in the application circuit.

Typical Operating Characteristics

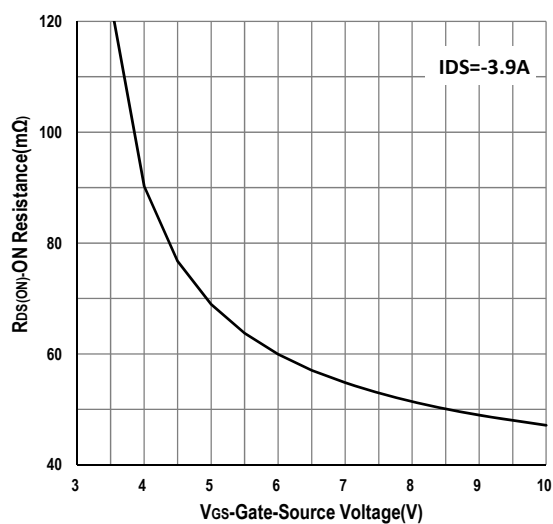
Output Characteristics



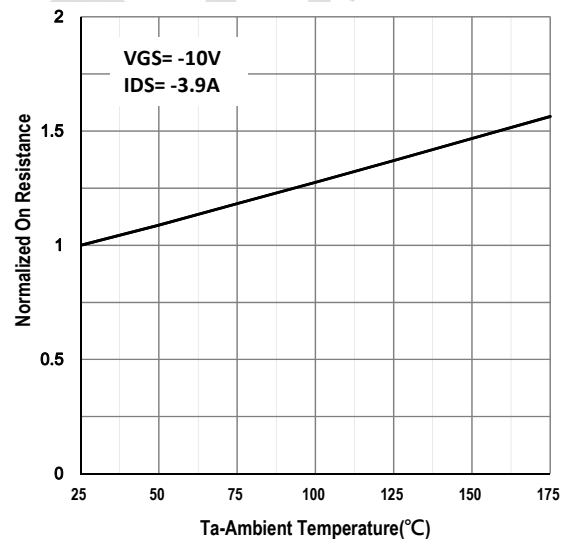
Gate Threshold Voltage



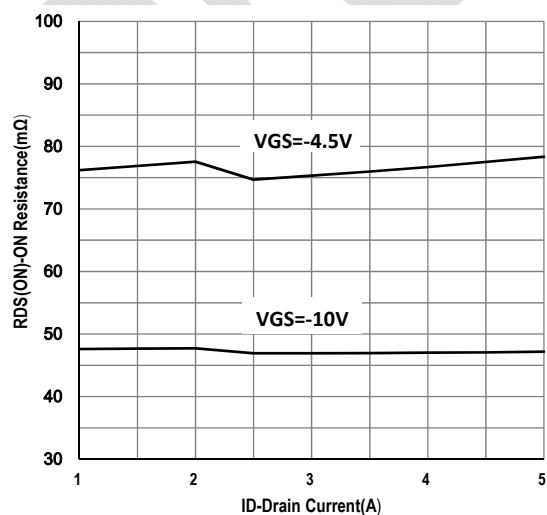
Gate-Source On Resistance



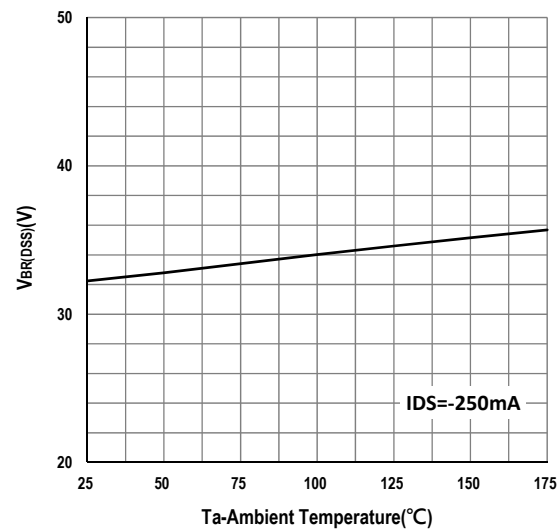
Drain-Source On Resistance



Drain-Source On Resistance

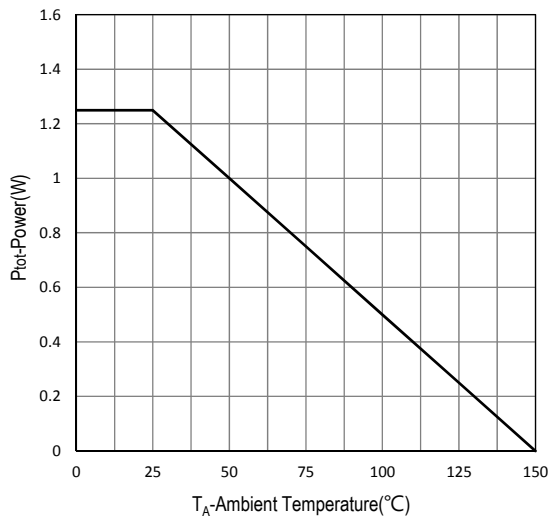


Drain-source Breakdown Voltage

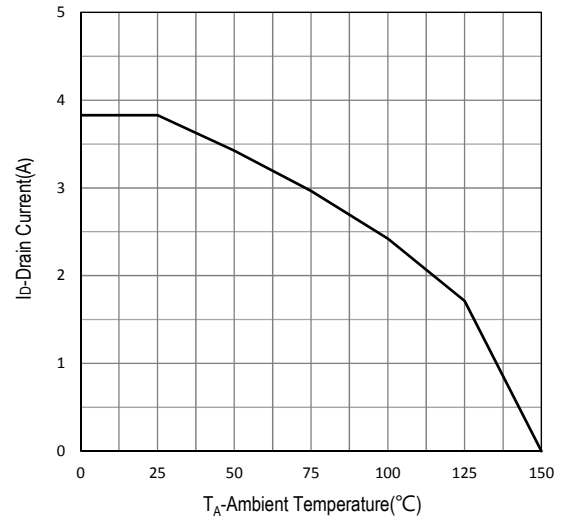


Typical Operating Characteristics (Cont.)

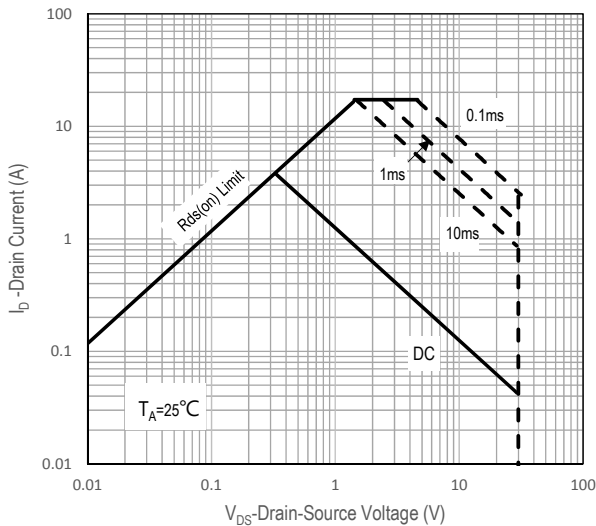
Power Dissipation



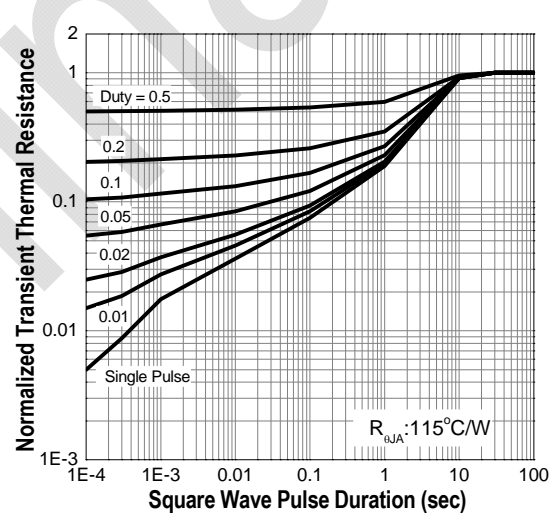
Drain Current



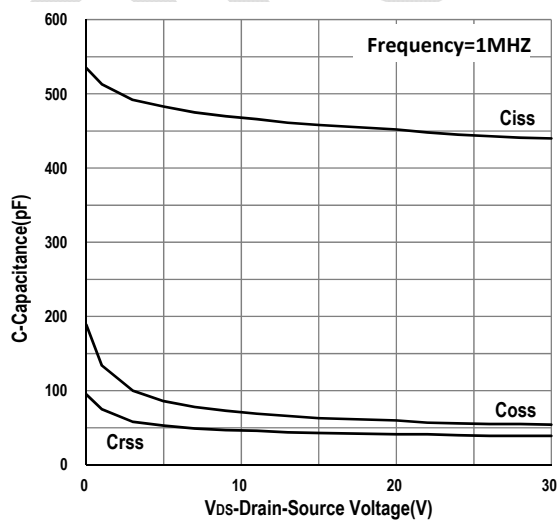
Safe Operation Area



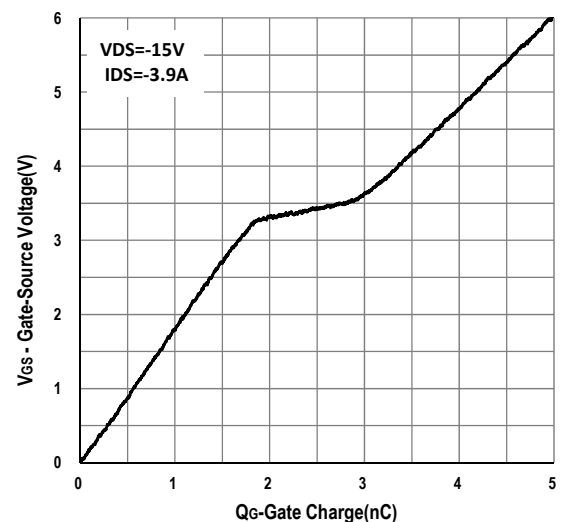
Transient Thermal Impedance




Capacitance



Gate Charge

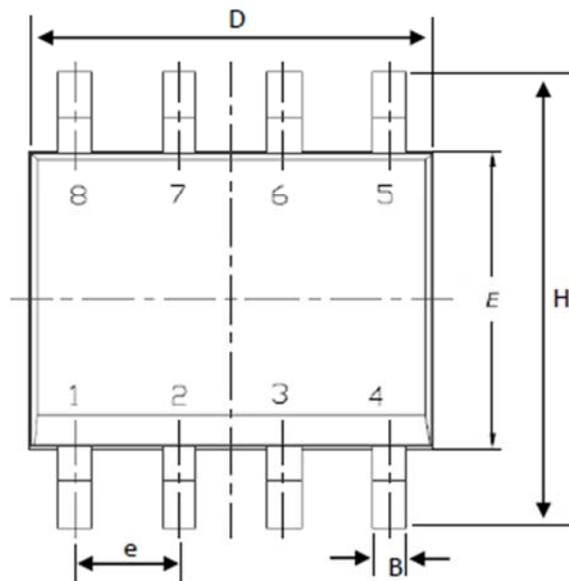


Marking Information

SOP-8	Marking Rule
<p>Laser Marking</p>  <p>SGP3060S</p> <p>YYMMXXX</p>	<p><u>Line 1</u> : Device Name SGP3060S</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

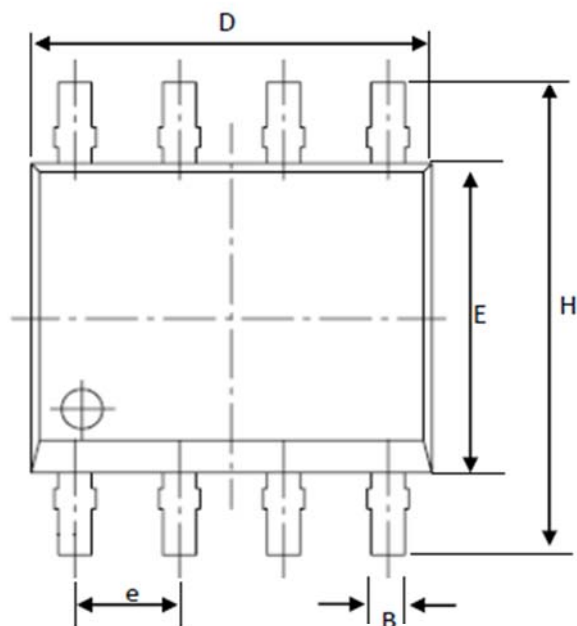
Package of Dimension

G-TYPE



Symbol	Min	Nor	Max
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
B	0.31	0.41	0.51
c	0.17	0.21	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27	1.27	1.27
H	5.80	6.00	6.20
L	0.40	0.84	1.27
α	0.00	4.00	8.00

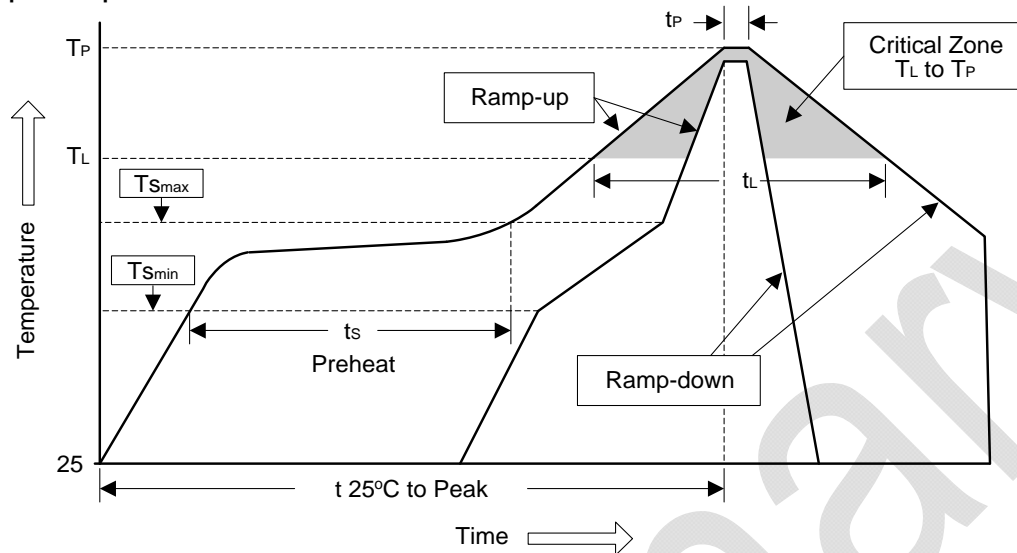
B-TYPE



Soldering Methods for Silicongear's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat <ul style="list-style-type: none"> - Temperature Min (T_{Smin}) - Temperature Max (T_{Smax}) - Time (min to max) (t_s) 	100°C 150°C 60 to 120 sec	150°C 200°C 60 to 180 sec
T_{Smax} to T_L <ul style="list-style-type: none"> - Ramp-up Rate 	<3°C/sec	<3°C/sec
Time maintained above: <ul style="list-style-type: none"> - Temperature (T_L) - Time (t_L) 	183°C 60 to 150 sec	217°C 60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

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