



SILICONGEAR

SGD3225J

30V / -30V Complementary, Power MOSFET

N-Channel : V_{DSS} , 30V $R_{DS(ON)}$, 18m Ω (max.) @ $V_{GS}=10V$ $R_{DS(ON)}$, 28m Ω (max.) @ $V_{GS}=4.5V$ I_D , 7A	P-Channel : V_{DSS} , -30V $R_{DS(ON)}$, 40m Ω (max.) @ $V_{GS}=-10V$ $R_{DS(ON)}$, 63m Ω (max.) @ $V_{GS}=-4.5V$ I_D , -4.7A	JSOT-8	

Description	Features
<p>The SGD3225J uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge.</p> <p>The complementary Power MOSFETs may be used in H-bridge, Inverters and other applications.</p>	<ul style="list-style-type: none"> • Low On-Resistance • Low Input Capacitance • Low Miller Charge • Low Input/Output Leakage
	Applications
	<ul style="list-style-type: none"> • Motor / Body Load Control • Automotive Systems • Load Switch

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SGD3225J	Halogen-Free	JSOT-8	J	Tape&Reel	3,000

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value		Unit	
Drain-Source Voltage	V_{DS}	30	-30	V	
Gate-Source Voltage	V_{GS}	± 20		V	
Drain Current-Continuous	I_D	$T_A=25^\circ\text{C}$	7	-4.7	A
		$T_A=70^\circ\text{C}$	5.6	-3.7	A
Drain Current-Pulsed ^{Note 1}	I_{DM}	34	-22	A	
Maximum Power Dissipation	P_D	$T_A=25^\circ\text{C}$	1.4	1.4	W
		$T_A=25^\circ\text{C}$	0.9	0.9	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}	$R_{\theta JA}$	$t < 10$ sec.	-	-	85	$^\circ\text{C/W}$

**N-Channel Electrical Characteristics** ($T_J = 25^\circ\text{C}$ unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_{DS} = 250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	1	1.5	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_{DS} = 4A$	-	14	18	m Ω
		$V_{GS} = 4.5V, I_{DS} = 2A$	-	21	28	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$	-	539	-	pF
Output Capacitance	C_{oss}		-	66	-	
Reverse Transfer Capacitance	C_{rss}		-	54	-	
Forward Transconductance	g_{fs}	$V_D = 15V, I_D = 4A$	-	20	-	S
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$	-	2	-	Ω

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = 15V, V_{GS} = 10V, R_g = 3.3\Omega, I_D = 4A$	-	3	-	ns
Rise Time	t_r		-	7.6	-	
Turn-Off Delay Time	$T_{d(off)}$		-	21	-	
Fall Time	t_f		-	4	-	
Total Gate Charge at 4.5V	Q_g	$V_{DS} = 15V, I_{DS} = 4A, V_{GS} = 4.5V$	-	6.2	-	nC
Gate to Source Gate Charge	Q_{gs}		-	2.4	-	
Gate to Drain "Miller" Charge	Q_{gd}		-	2.5	-	

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
Continuous Source Current	I_S	$V_G = V_D = 0V, \text{Force Current}$	-	-	7	A
Pulsed Source Current	I_{SM}		-	-	34	A

Notes:

- Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on 2oz FR-4 in still air.



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

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_{DS} = -250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$	-	-	-1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{DS} = -250\mu A$	-1	-	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_{DS} = -3A$	-	32	40	m Ω
		$V_{GS} = -4.5V, I_{DS} = -2A$	-	50	63	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	554	-	pF
Output Capacitance	C_{oss}		-	95	-	
Reverse Transfer Capacitance	C_{rss}		-	80	-	
Forward Transconductance	g_{fs}	$V_D = -10V, I_D = -3A$	-	13	-	S

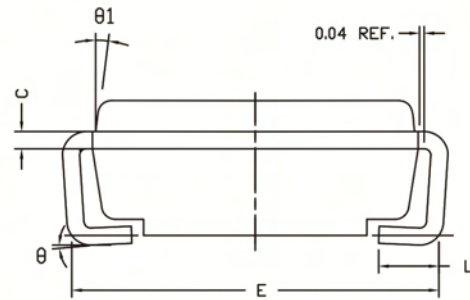
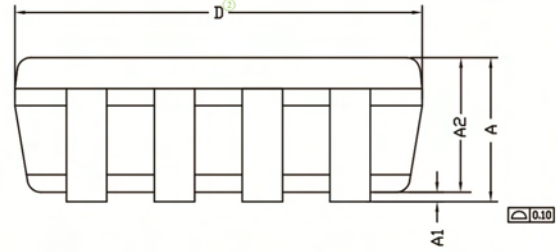
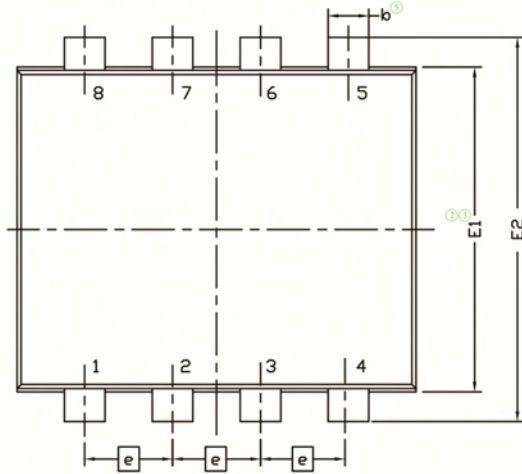
SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = -24V, V_{GS} = -10V, R_G = 3.3\Omega, I_D = -1A$	-	2.4	-	ns
Rise Time	t_r		-	8.1	-	
Turn-Off Delay Time	$T_{d(off)}$		-	31.7	-	
Fall Time	t_f		-	5.6	-	
Total Gate Charge at -4.5V	Q_g	$V_{DS} = -15V, V_{GS} = -4.5V, I_D = -1A$	-	5.7	-	nC
Gate to Source Gate Charge	Q_{gs}		-	2.9	-	
Gate to Drain "Miller" Charge	Q_{gd}		-	1.7	-	

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
Continuous Source Current	I_S	$V_G = V_D = 0V, \text{Force Current}$	-	-	-24	A
Pulsed Source Current	I_{SM}		-	-	-48	A
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 1A, di/dt = 100A/\mu s, T_J = 25^\circ C$	-	5.6	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	1.3	-	nC

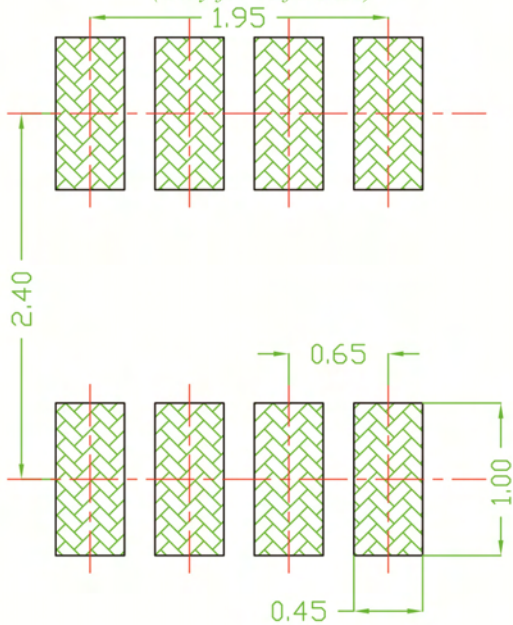
- Notes:**
- Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
 - $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on 2oz FR-4 in still air.



Outline Dimension



Land Pattern
(Only for Reference)



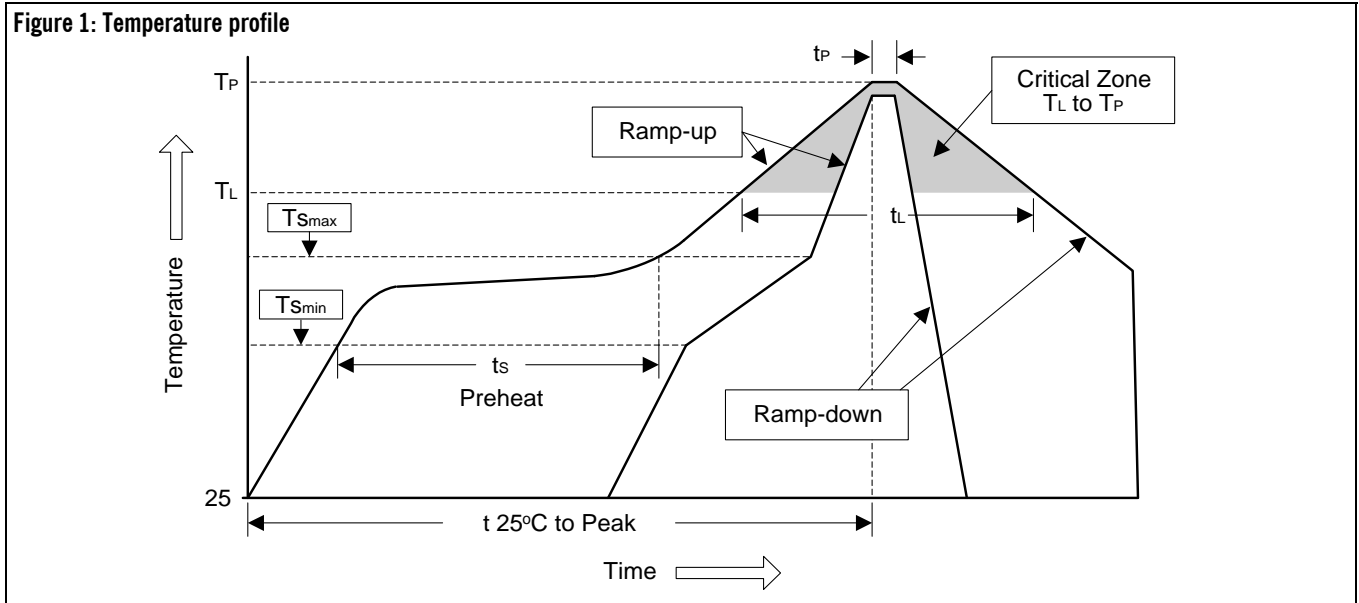
SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	2.50	---	3.00
E1	2.30	2.40	2.50
E2	2.65	2.85	3.05
L	0.30	0.45	0.60
A	0.935	---	1.10
A1	0.01	---	0.10
A2	0.925	---	1.00
D	2.95	3.05	3.10
e	0.65BSC		
b	0.25	0.32	0.40
c	0.10	0.15	0.20
θ	0	4°	8°
θ1	7° NOM.		

Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.
5. Dimension "b" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.08 mm Total In Excess Of "b" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.

Soldering Methods

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



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		
- Temperature Min (T _{Smin})	100°C	150°C
- Temperature Max (T _{Smax})	150°C	200°C
- Time (min to max) (t _s)	60 to 120 sec	60 to 180 sec
T _{Smax} to T _L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T _L)	183°C	217°C
- Time (t _L)	60 to 150 sec	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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