



S I L I C O N G E A R

SGD6240QD

60V / -60V Complementary, Power MOSFET

N-Channel : V_{DSS} , 60V $R_{DS(ON)}$, 38m Ω (max.) @ $V_{GS}=10V$ $R_{DS(ON)}$, 48m Ω (max.) @ $V_{GS}=4.5V$ I_D , 27A	P-Channel : V_{DSS} , -60V $R_{DS(ON)}$, 85m Ω (max.) @ $V_{GS}=-10V$ $R_{DS(ON)}$, 105m Ω (max.) @ $V_{GS}=-4.5V$ I_D , -18A	PDFN-8 5x6 (Dual)		

Description	Features
<p>The SGD6240QD 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
SGD6240QD	Halogen-Free	PDFN-8 5x6 (Dual)	QD	Tape & Reel	2,500

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

Parameter	Symbol	Value		Unit	
Drain-Source Voltage	V_{DS}	60	-60	V	
Gate-Source Voltage	V_{GS}	± 20		V	
Drain Current-Continuous	I_D	$T_C=25^\circ\text{C}$	27	-18	A
		$T_C=100^\circ\text{C}$	17	-11	A
Drain Current-Pulsed ^{Note 1}	I_{DM}	60	-30	A	
Maximum Power Dissipation	P_D	$T_C=25^\circ\text{C}$	41.7		W
		$T_C=100^\circ\text{C}$	16.7		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}	$R_{\theta JA}$	Steady State	-	-	62	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case ^{Note 2}	$R_{\theta JC}$	Steady State	-	-	3	$^\circ\text{C}/\text{W}$

**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}	$V_{GS} = 0V, I_{DS} = 250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	-	-	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	$R_{DS(ON)}$	$V_{GS} = 10V, I_{DS} = 8A$	-	31	38	m Ω
		$V_{GS} = 4.5V, I_{DS} = 4A$	-	38	48	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$	-	1027	-	pF
Output Capacitance	C_{oss}		-	65	-	
Reverse Transfer Capacitance	C_{rss}		-	46	-	

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = 30V, V_{GS} = 10V, R_G = 3.3\Omega, I_D = 10A$	-	3	-	ns
Rise Time	t_r		-	34	-	
Turn-Off Delay Time	$T_{d(off)}$		-	23	-	
Fall Time	t_f		-	6	-	
Total Gate Charge at 4.5V	Q_g	$V_{DS} = 48V, I_{DS} = 10A, V_{GS} = 10V$	-	19	-	nC
Gate to Source Gate Charge	Q_{gs}		-	2.6	-	
Gate to Drain "Miller" Charge	Q_{gd}		-	4.1	-	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 11A$	-	-	1.2	V
Continuous Source Current	I_S	$V_G = V_D = 0V, \text{Force Current}$	-	-	27	A
Pulsed Source Current	I_{SM}		-	-	60	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 FR-4 in still air.

**P-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}	$V_{GS} = 0V, I_{DS} = -250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60V, V_{GS} = 0V$	-	-	-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	$R_{DS(ON)}$	$V_{GS} = -10V, I_{DS} = -4A$	-	70	85	m Ω
		$V_{GS} = -4.5V, I_{DS} = -2A$	-	90	105	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	1026	-	pF
Output Capacitance	C_{oss}		-	69	-	
Reverse Transfer Capacitance	C_{riss}		-	47	-	

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = -15V, V_{GS} = -10V, R_G = 3.3\Omega, I_D = -1A$	-	8.3	-	ns
Rise Time	t_r		-	18.6	-	
Turn-Off Delay Time	$T_{d(off)}$		-	44.8	-	
Fall Time	t_f		-	9.1	-	
Total Gate Charge at -4.5V	Q_g	$V_{DS} = -12V, I_{DS} = -4A, V_{GS} = -4.5V$	-	11.2	-	nC
Gate to Source Gate Charge	Q_{gs}		-	1.8	-	
Gate to Drain "Miller" Charge	Q_{gd}		-	6.1	-	

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	V
Continuous Source Current	I_S	$V_G = V_D = 0V, \text{Force Current}$	-	-	-18	A
Pulsed Source Current	I_{SM}		-	-	-30	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 FR-4 in still air.

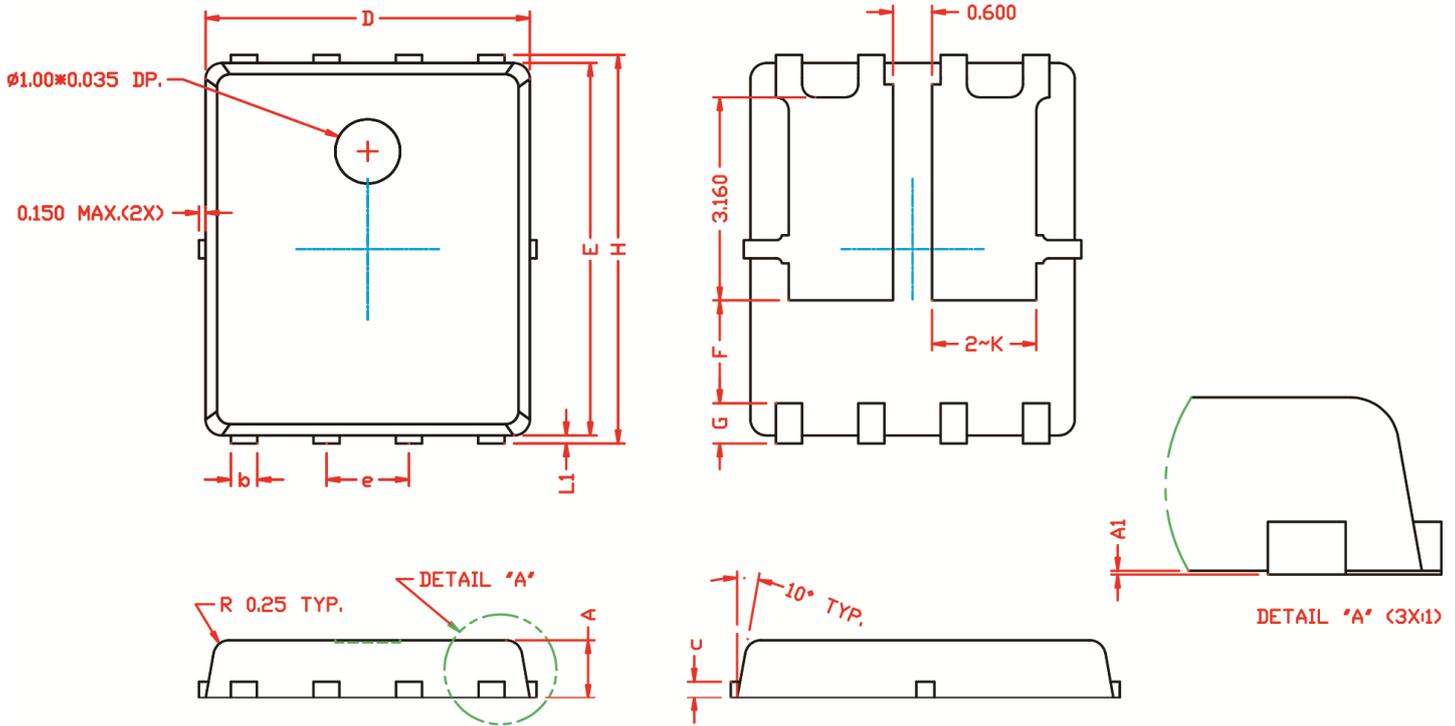


SILICONGEAR

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Outline Dimension



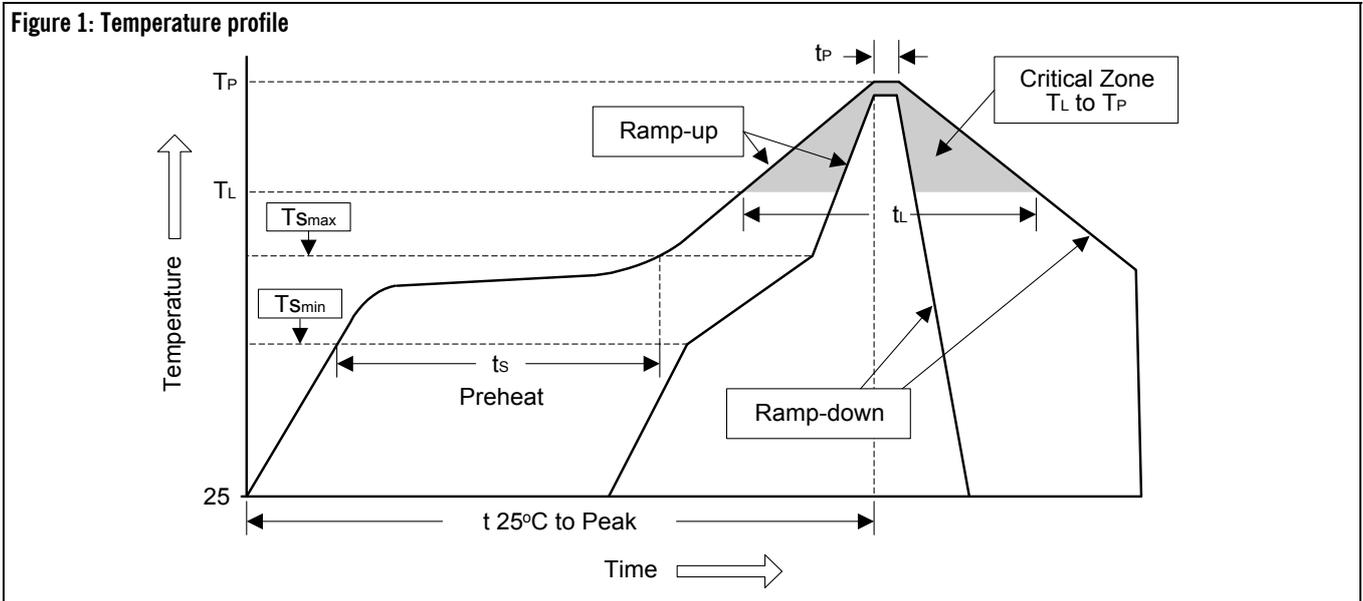
DIMENSIONS

REF.	Millimeters		REF.	Millimeters	
	Min.	Max.		Min.	Max.
A	0.80	1.00	E	5.70	5.90
A1	0.00	0.05	e	1.27 BSC.	
b	0.35	0.49	H	5.95	6.20
c	0.254 Ref.		L1	0.10	0.18
D	4.90	5.10	G	0.60 Ref.	
F	1.60 Ref.		K	1.60 Ref.	



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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