

V_{DSS} , 40V R_{DS(ON)} , 3.0mΩ (max.) @ V_{GS}=10V R_{DS(ON)} , 3.6mΩ (max.) @ V_{GS}=4.5V I_D , 100A ^{Note 3}	TO-252	

Description	Features
<p>The SG40N01LD uses advanced Trench technology and designs to provide excellent R_{DS(ON)} with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.</p>	<ul style="list-style-type: none"> • Low On-Resistance • Low Input Capacitance • Low Miller Charge • Low Input / Output Leakage • Pb-free lead plating; RoHS compliant
	Applications
	<ul style="list-style-type: none"> • Lithium-Ion Secondary Batteries • Load Switch • DC-DC converters and Off-line UPS

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG40N01LD	Halogen-Free	TO-252	D	Tape & Reel	2,500

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	±20	V
Drain Current-Continuous ^{Note 1}	I _D	T _C =25°C	100 ^{Note 3}
		T _C =100°C	97
Drain Current-Pulsed ^{Note 1}	I _{DM}	400	A
Avalanche Current	I _{AS}	50	A
Avalanche Energy, L=0.1mH	E _{AS}	125	mJ
Maximum Power Dissipation	P _D	T _C =25°C	80.6
		T _C =100°C	32.3
Storage Temperature Range	T _{STG}	-55 to +150	°C
Operating Junction Temperature Range	T _J	-55 to +150	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{Note 2}	R _{θJA}	Steady State	-	-	62	°C/W
Maximum Junction-to-Case	R _{θJC}	Steady State	-	-	1.55	°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	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =32V, 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	1.3	-	2.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =15A	-	-	3.0	mΩ
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _{DS} =10A	-	-	3.6	mΩ

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1MHz	-	4222	-	pF
Output Capacitance	C _{oss}		-	889	-	
Reverse Transfer Capacitance	C _{rss}		-	398	-	
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	2.2	3	Ω

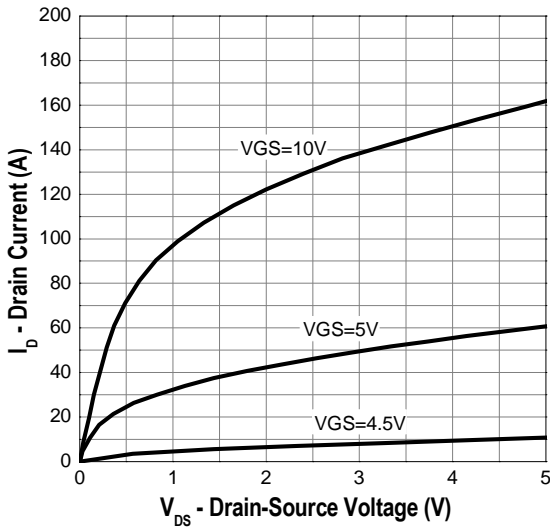
SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T _{d(on)}	V _{DS} =20V, I _{DS} =50A, V _{GS} =10V, R _{GEN} =3Ω	-	21	-	ns
Rise Time	t _r		-	6	-	
Turn-Off Delay Time	T _{d(off)}		-	98	-	
Fall Time	t _f		-	17	-	
Total Gate Charge at 10V	Q _g	V _{DS} =20V, I _{DS} =50A, V _{GS} =10V	-	91	-	nC
Gate to Source Gate Charge	Q _{gs}		-	34	-	
Gate to Drain "Miller" Charge	Q _{gd}		-	19.9	-	

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 _{DS} =50A	-	-	1.3	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =50A, dI/dt=100A/μs	-	32	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	120	-	nC

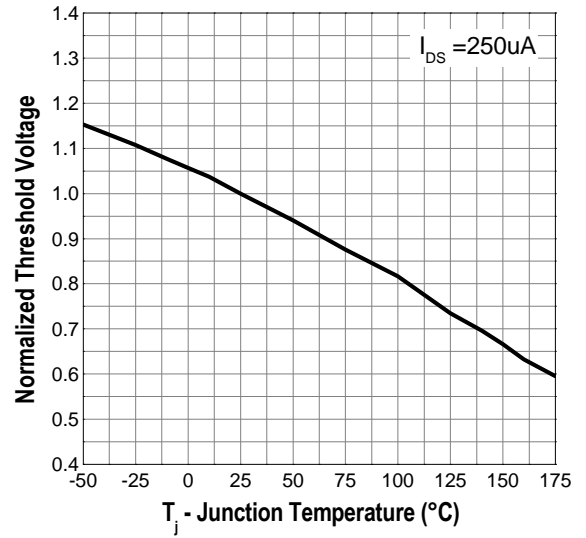
- Notes:**
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
 2. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θJA} is determined by the user's board design. R_{θJA} shown below for single device operation on FR-4 in still air.
 3. The maximum current rating is limited by package.

Typical Operating Characteristics

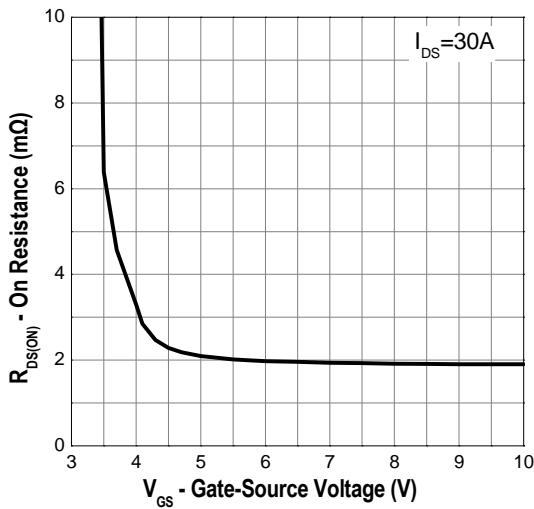
Output Characteristics



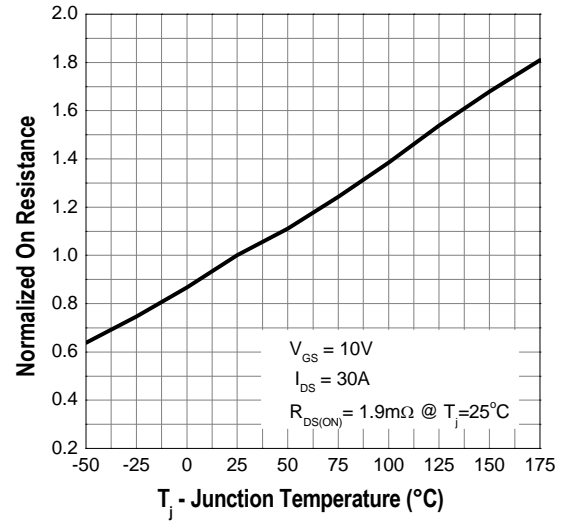
Gate Threshold Voltage



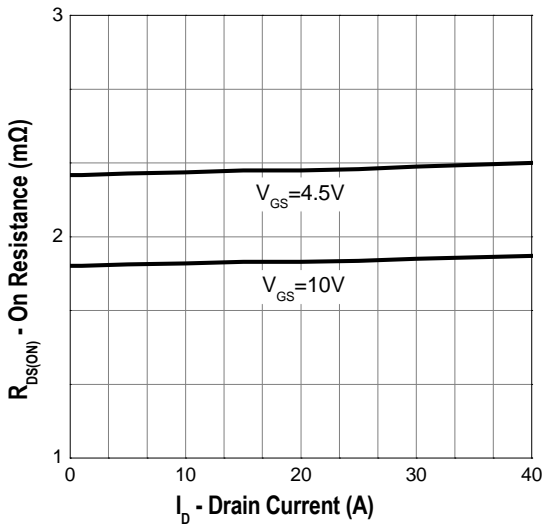
Gate-Source On Resistance



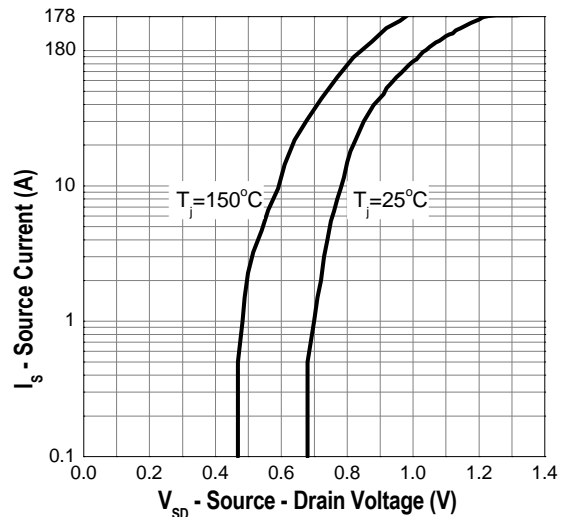
Drain-Source On Resistance



Drain-Source On Resistance

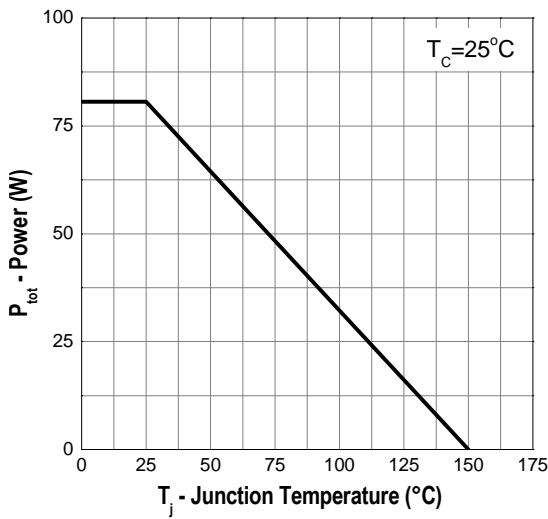


Source-Drain Diode Forward

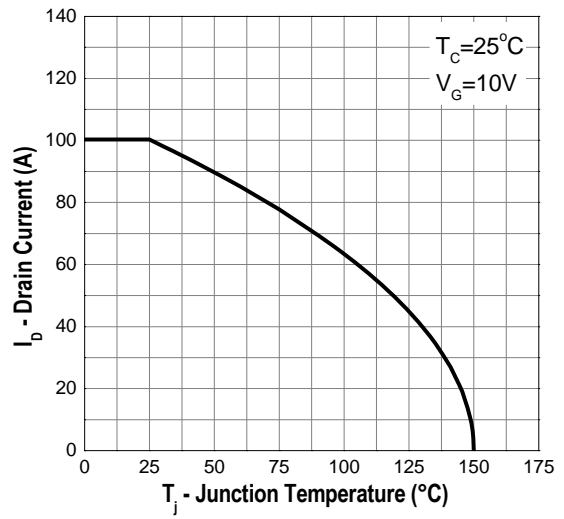


Typical Operating Characteristics (Cont.)

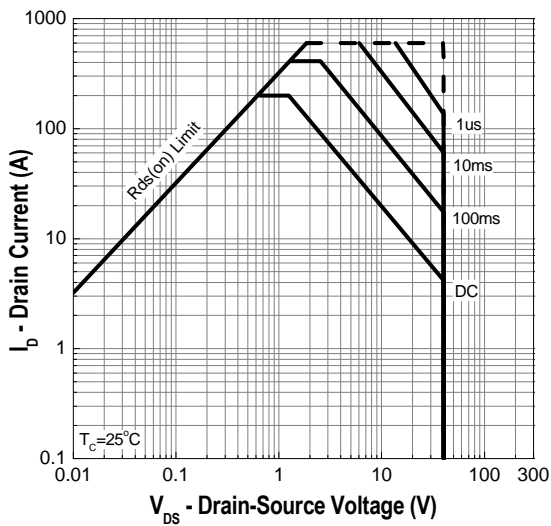
Power Dissipation



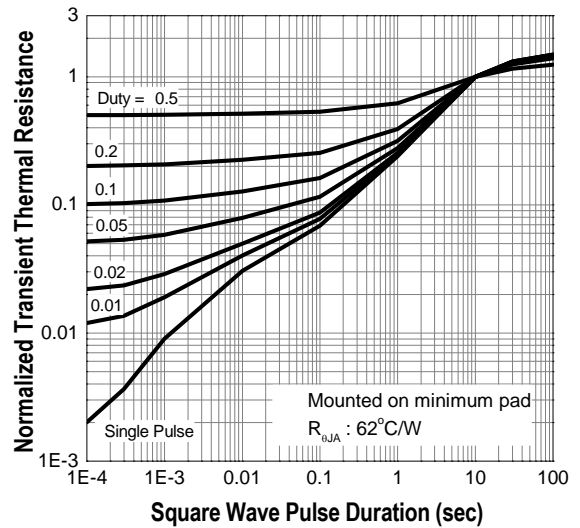
Drain Current



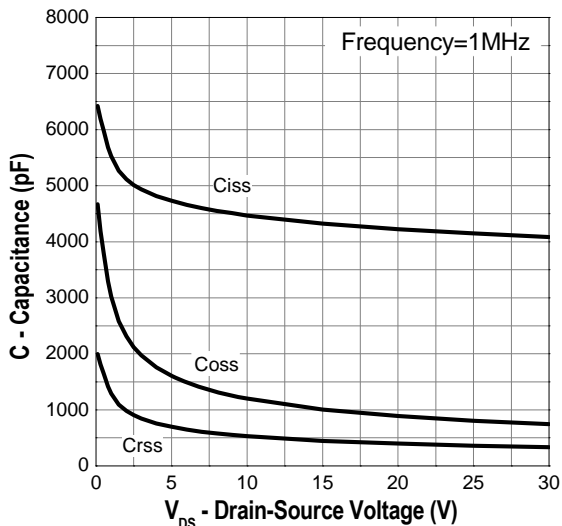
Safe Operation Area



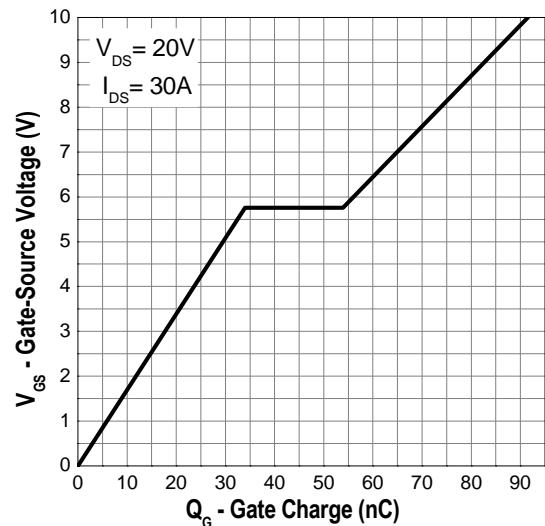
Transient Thermal Impedance



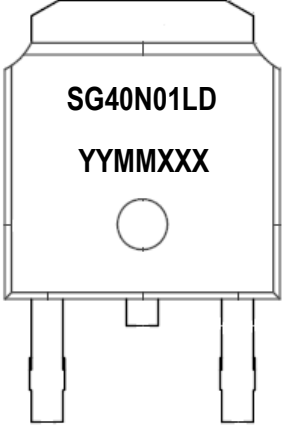
Capacitance



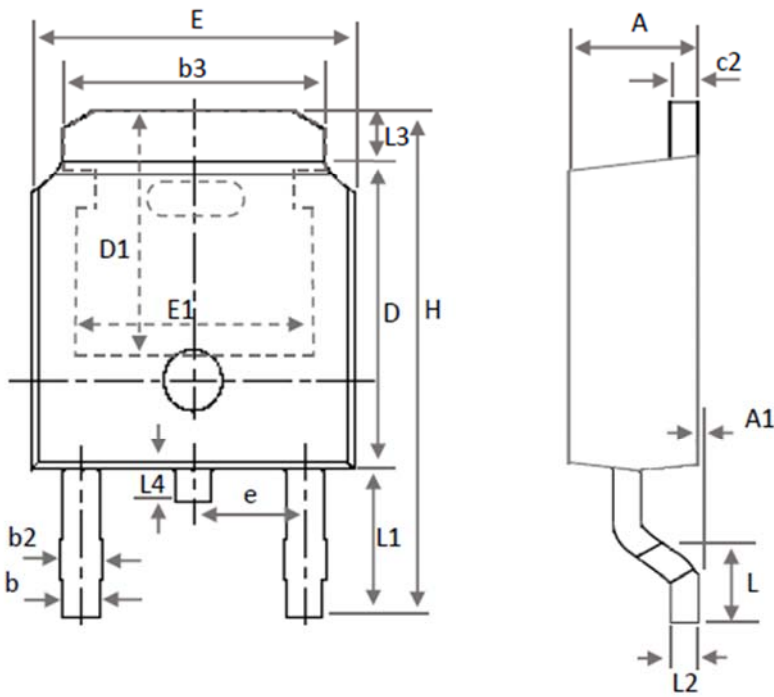
Gate Charge



Marking Information

TO-252 (D)	Marking Rule
<p>Laser Marking</p>  <p>The diagram shows a TO-252 (D) MOSFET package. The top surface of the package is marked with the device identifier 'SG40N01LD' and the date code 'YYMMXXX'. The package has three leads extending from the bottom: a central lead and two side leads.</p>	<p><u>Line 1</u> : Device SG40N01LD</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

Package of Dimension

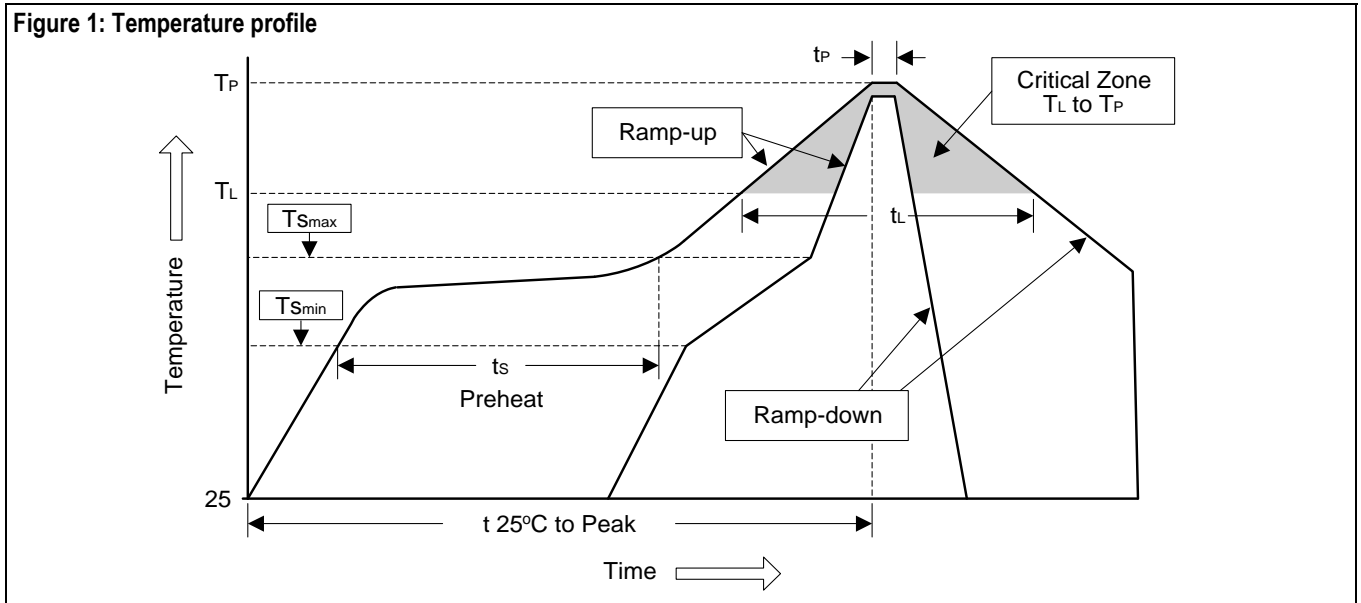


Symbol	Min	Nor	Max
E	6.35	6.54	6.731
L	1.40	1.59	1.78
L1	2.743 Ref.		
L2	0.508 BSC		
L3	0.89	1.08	1.27
L4	0.60	0.81	1.01
D	5.97	6.10	6.223
H	9.40	9.91	10.41
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	4.95	5.21	5.46
e	2.286 BSC		
A	2.18	2.29	2.39
A1	0.00	0.07	0.13
c2	0.46	0.68	0.89
D1	5.21	-	-
E1	4.32	-	-

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		
- 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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