

●General Description

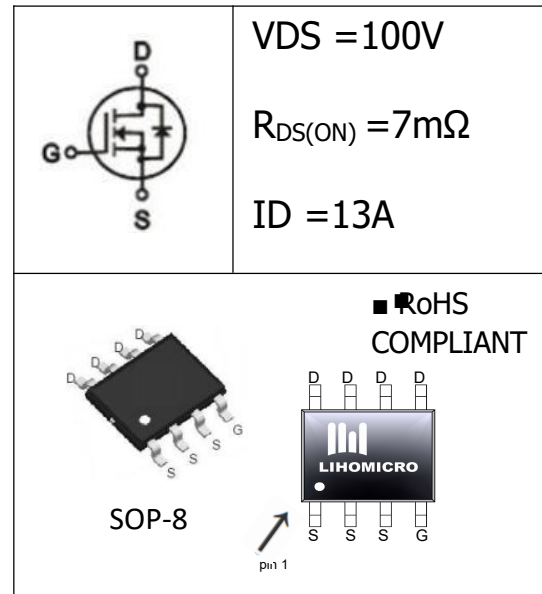
The N-Channel SGT MOSFET LH13N10S has the low $R_{DS(on)}$, low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for fast charge and lighting.

●Features

- Optimized for synchronous rectification Low Input Capacitance
- Low Miller Charge
- Fully Characterized Capacitance and Avalanche

●Application

- Battery powered circuits
- Half-bridge and full-bridge topologies
- Synchronous rectifier applications
- Resonant mode power supplies



●Ordering Information:

Part Number	LH13N10S
Package	SOP-8
Basic Ordering Unit (pcs)	4000
Normal Package Material Ordering Code	LH13N10SS-SOP8-TAP
Halogen Free Ordering Code	LH13N10SS-SOP8-TAP-HF

●Absolute Maximum Ratings (TC = 25°C)

PARAMETER	SYMBOL	Value	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $T_C = 25^\circ C$	I_D	13	A
Pulsed drain current $^1 T_C = 25^\circ C$	I_{DM}	95	A
Single Pulse Avalanche Energy ²	E_{AS}	130	mJ
Avalanche Current	I_{AS}	18	A
Power Dissipation($T_C=25^\circ C$)	P_D	3.1	W
Operating Temperature	T_J	-55~+150	$^\circ C$
Storage Temperature	T_{STG}	-55~+150	$^\circ C$

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.4	V
Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=13A$	--	7	9	mΩ
		$V_{GS}=4.5V, I_D=11A$	--	9	12	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=80V, V_{GS}=0V, T_J=25^\circ C$	--	--	10	uA
		$V_{DS}=80V, V_{GS}=0V, T_J=125^\circ C$	--	--	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V$	--	--	± 100	nA
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=50V, f=1MHz$	--	2363	--	pF
Output Capacitance	C_{oss}		--	283	--	
Reverse Transfer Capacitance	C_{rss}		--	8	--	
Rise time	t_r	$V_{GS}=10V, V_{DS}=50V$ $R_{G_ext}=3.6\Omega, I_D=13A$	--	15.4	--	ns
Turn-on delay time	$t_{d(on)}$		--	9.4	--	
Fall time	t_f		--	24.2	--	
Turn -Off Delay Time ⁵	$T_d(off)$		--	44	--	
Gate-to-Source Charge	Q_{gs}	$V_{DD}=50V, I_D=13A,$ $V_{GS}=0 \text{ to } 10V$	--	8.43	--	nC
Gate charge at threshold	$Q_{g(th)}$		--	8.1	--	
Gate-to-Drain Charge	Q_{gd}		--	14.7	--	
Switching charge	Q_{SW}		--	15	--	
Total Gate Charge	Q_g		--	48	--	
Total Gate Charge	Q_g	$V_{DD}=50V, I_D=13A,$ $V_{GS}=0 \text{ to } 4.5V$	--	26	--	nC
Gate charge total, sync. FET ($Q_g - Q_{gd}$)	$Q_{g(sync)}$	$V_{DS}=0.1V, V_{GS}=0 \text{ to } 10V$	--	33.3	--	
Gate plateau voltage	$V_{plateau}$	$V_{DS}=50V, I_D=13A,$ $V_{GS}=0 \text{ to } 10V$	--	3.38	--	V
Gate resistance	R_G	$f = 1.0MHz$ open drain	--	0.6	1	Ω
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=13A$	--	73	--	S
Continuous Diode Forward Current	I_S	$T_C = 25^\circ C$	--	--	13	A
Pulsed Diode Forward Current	I_{SM}		--	--	95	
Diode Forward Voltage	V_{SD}	$I_S=13A, V_{GS}=0V$	--	--	1.3	V
Body Diode Reverse Recovery Time	T_{rr}	$V_{DD}=50V, I_F=I_S,$ $di/dt=100A/\mu s$	--	37	--	nS
Body Diode Recovery Charge	Q_{rr}		--	36	--	nC

●Thermal Characteristics

PARAMETER	SYMBOL	MAX	UNIT
Thermal Resistance Junction-case	RthJC	2.4	°C/W
Thermal Resistance Junction-ambient ³	RthJA	75	°C/W

Notes:

- 1.Pulse Test: Pulse Width $\leq 380\mu\text{s}$, Duty Cycle $\leq 2\%$;
- 2.Limited by TJmax, starting TJ=25°C, L=0.5mH, Rg=50Ω, ID=18A, VGS=10V.
3. The value of RthA is measured with the device mounted on 1 in 2 FR-4 board with 2oz copper,in a Still air environment with Ta=25°C.

•Typical Characteristics

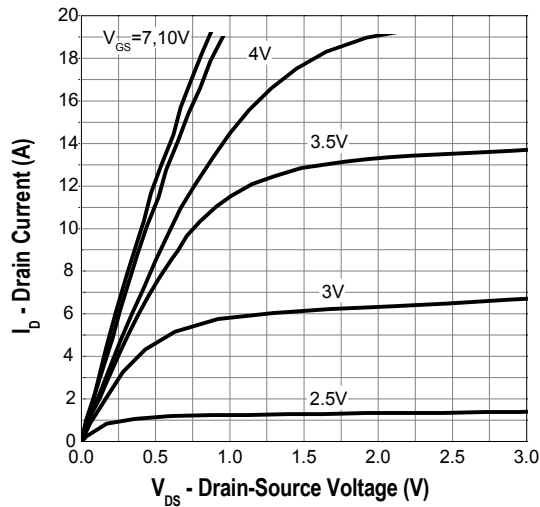


Fig.1 Output Characteristics

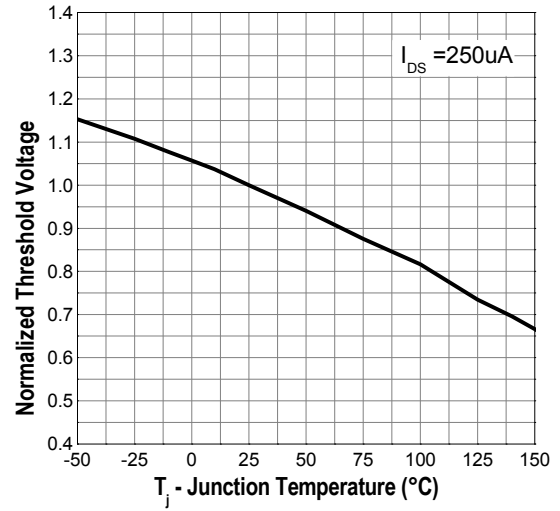


Fig.2 Gate Threshold Voltage

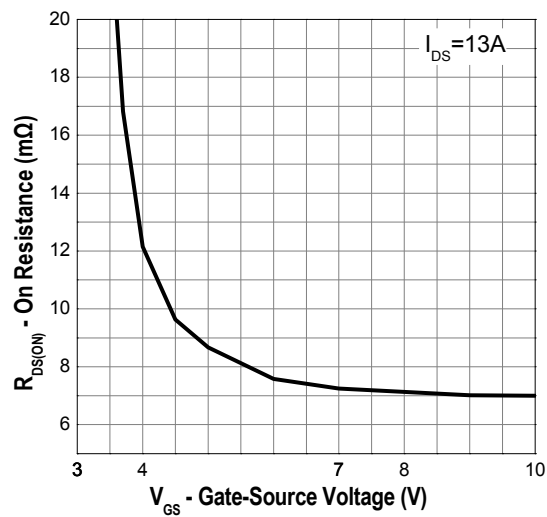


Fig.3 Gate-Source On Resistance

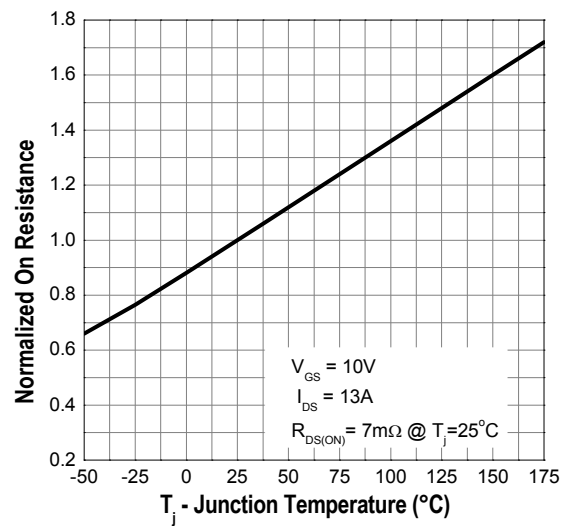


Fig.4 Drain-Source On Resistance

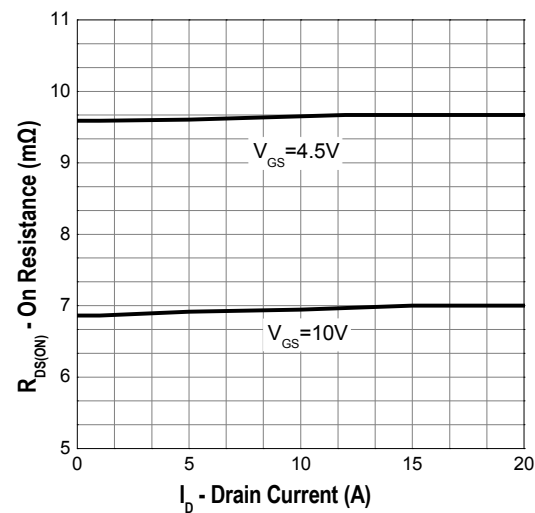


Fig.5 Drain-Source On Resistance

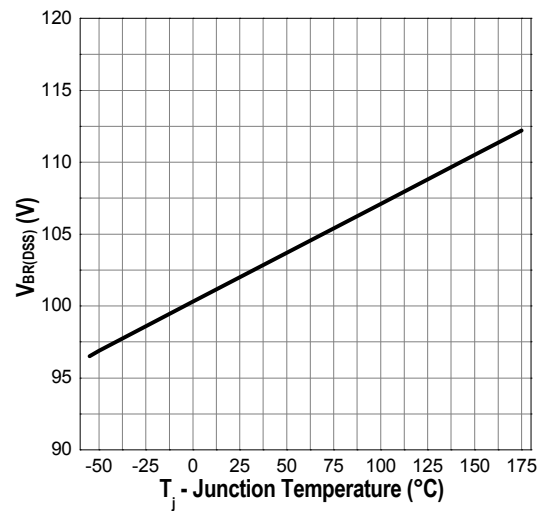
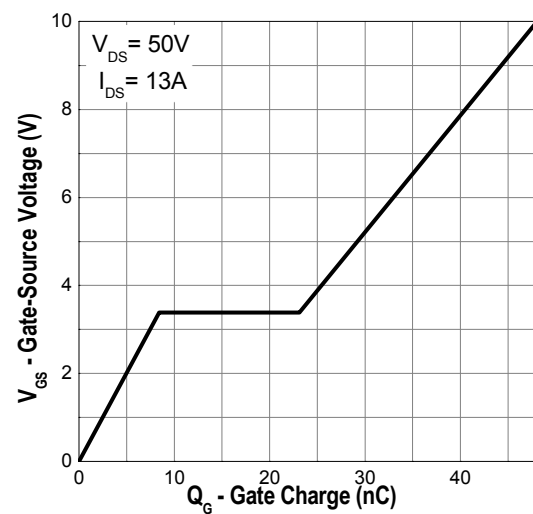
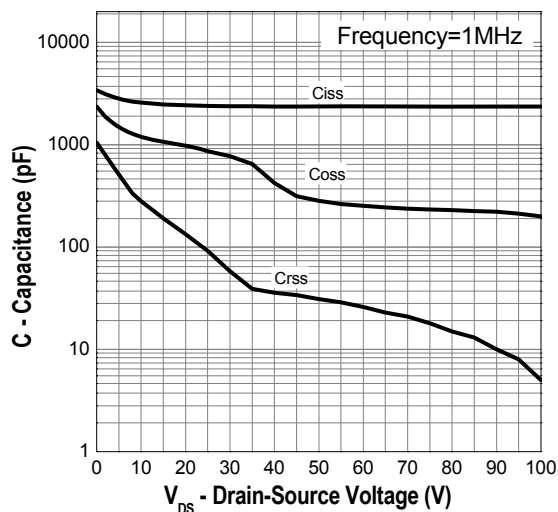
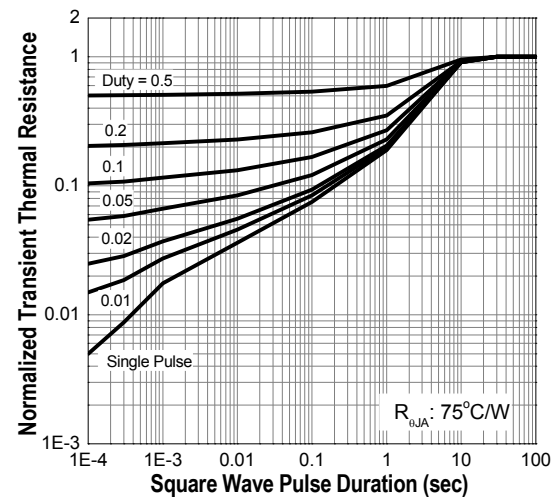
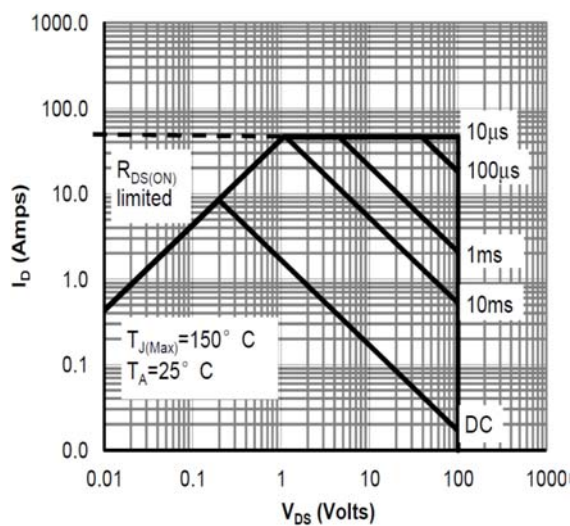
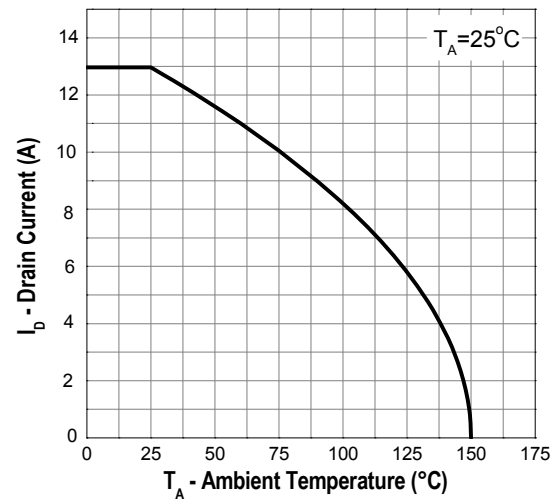
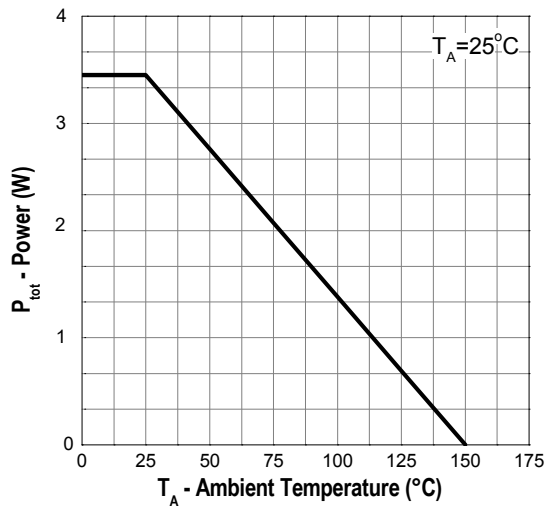


Fig.6 Drain-Source Breakdown Voltage

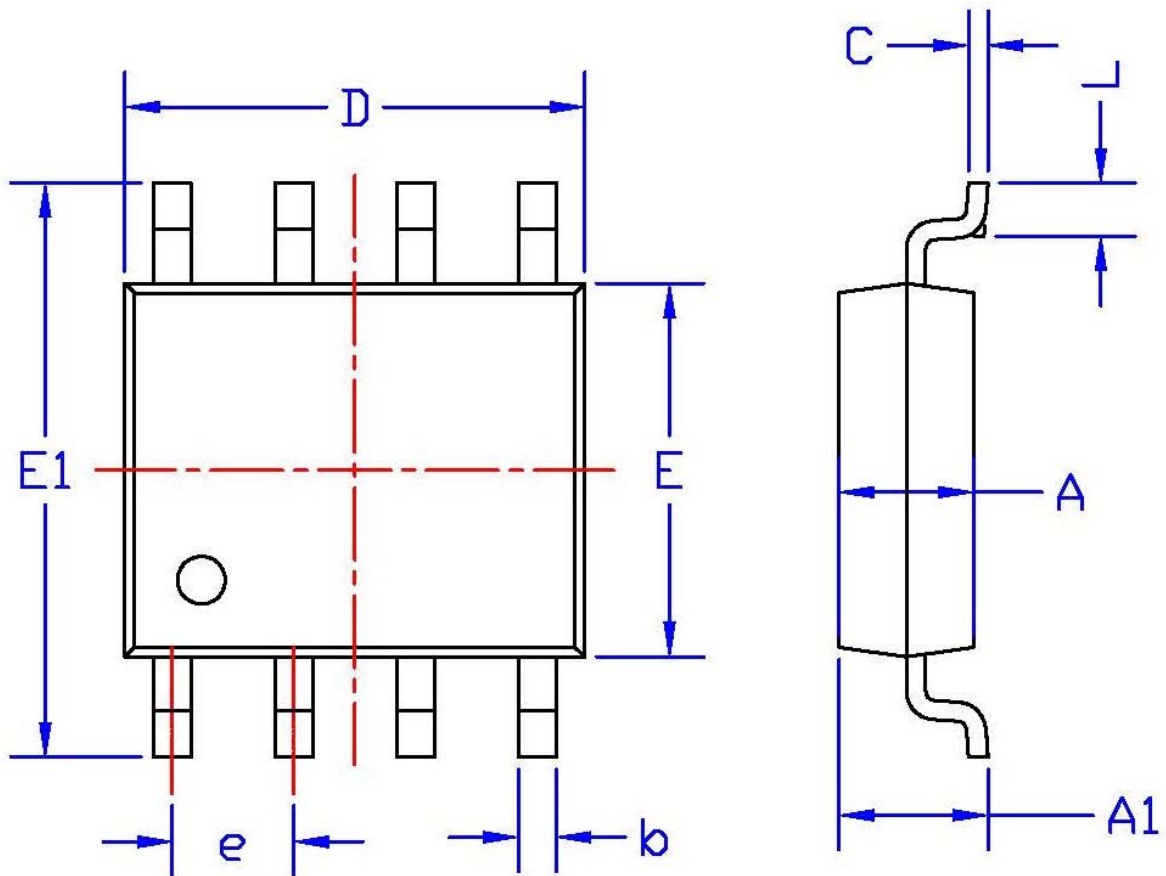
● Typical Characteristics(cont.)



●Dimensions (SOP-8)

UNIT:mm

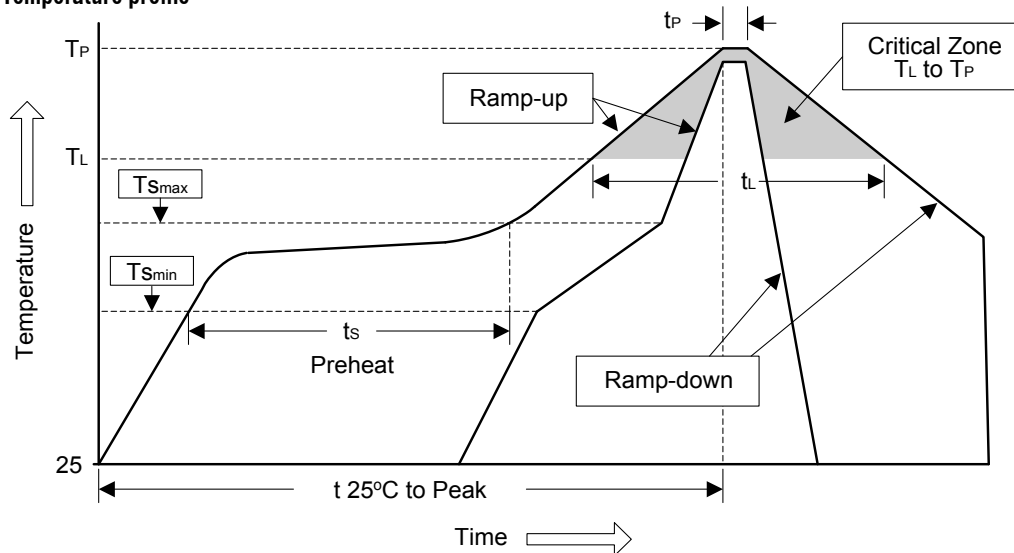
SYMBOL	min	max	SYMBOL	min	max
A	1.30	1.60	e	1.27BSC	
A1	1.35	1.85	L	0.40	1.30
b	0.30	0.60			
C	0.15	0.35			
D	4.60	5.20			
E	3.70	4.10			
E1	5.70	6.30			



• 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