Description

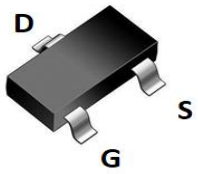
N-channel Enhancement Mode Power MOSFET

Features

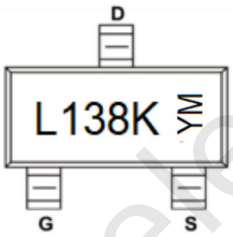
- 60V, 0.2A
  $R_{DS(ON)}$ < 2.2Ω @ V_{GS} = 10V
  $R_{DS(ON)}$ < 3Ω @ V_{GS} = 4.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free
- ESD Protected: 2KV

Applications

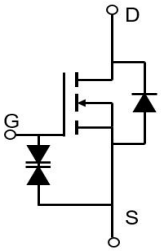
- Battery Operated System
- Direct logic-level Interfac: TTL/CMOS
- Solid-State Relays



SOT-323-3L



Marking and Pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
L138K	CRMLATL138K	TAPING	SOT-323-3L	7"	3000	120000

Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DS}	Drain-to-Source Voltage		60	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25°C	0.2	A
		T_C = 100°C	0.13	
I_{DM}	Pulsed Drain Current (1)		0.8	A
P_D	Power Dissipation	T_C = 25°C	0.3	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(2)		415	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±10	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.7	1.1	1.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance (3)	V_{GS} = 10V, I_D = 0.3A	-	1.8	2.2	Ω
		V_{GS} = 4.5V, I_D = 0.2A	-	2.0	3.0	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz	-	22	-	pF
C_{oss}	Output Capacitance		-	3.4	-	pF
C_{rss}	Reverse Transfer Capacitance		-	2.3	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 4.5V, V_{DS} = 10V, I_D = 0.3A	-	1.6	-	nC
Q_{gs}	Gate Source Charge		-	0.2	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	0.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 10V, I_D= 0.2A, R_{GEN} = 10Ω	-	2	-	ns
t_r	Turn-On Rise Time		-	14	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	6	-	ns
t_f	Turn-Off Fall Time		-	19	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	0.3	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	1.2	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 0.3A	-	-	1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Test Circuit

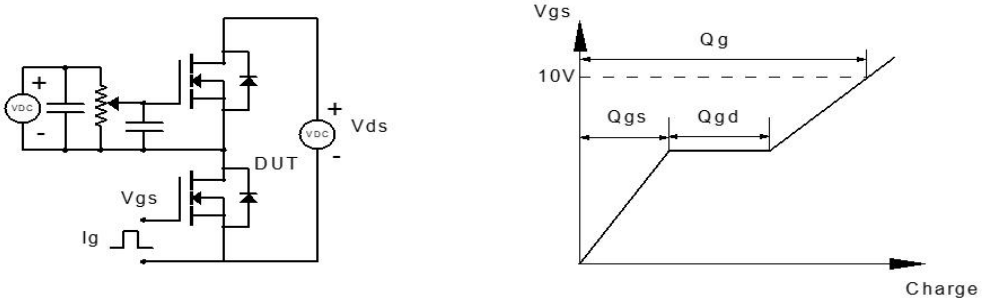


Figure 1: Gate Charge Test Circuit & Waveform

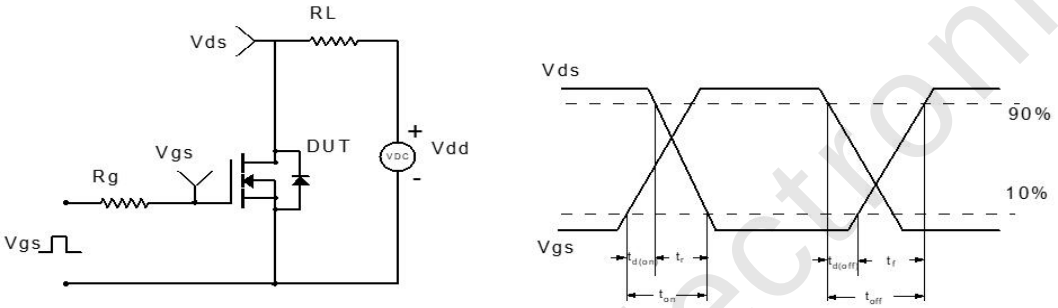


Figure 2: Resistive Switching Test Circuit & Waveform

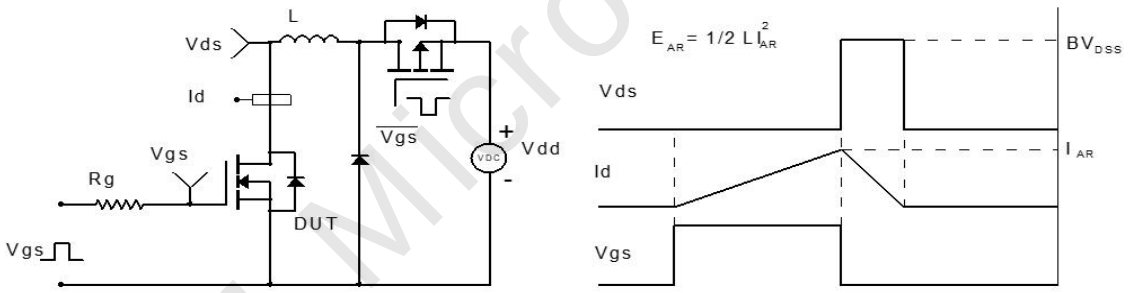


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

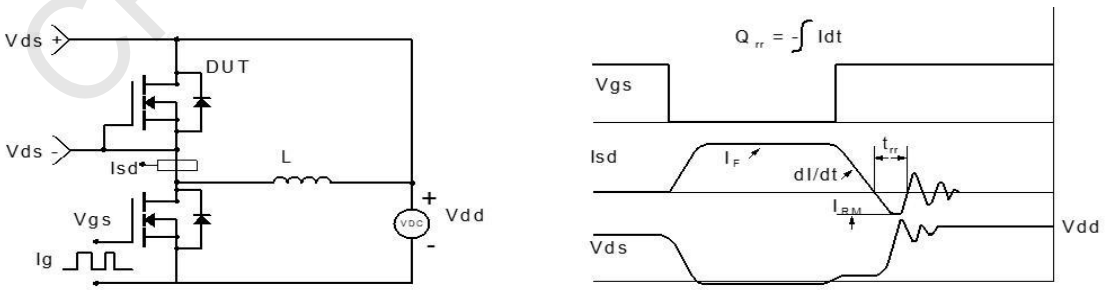
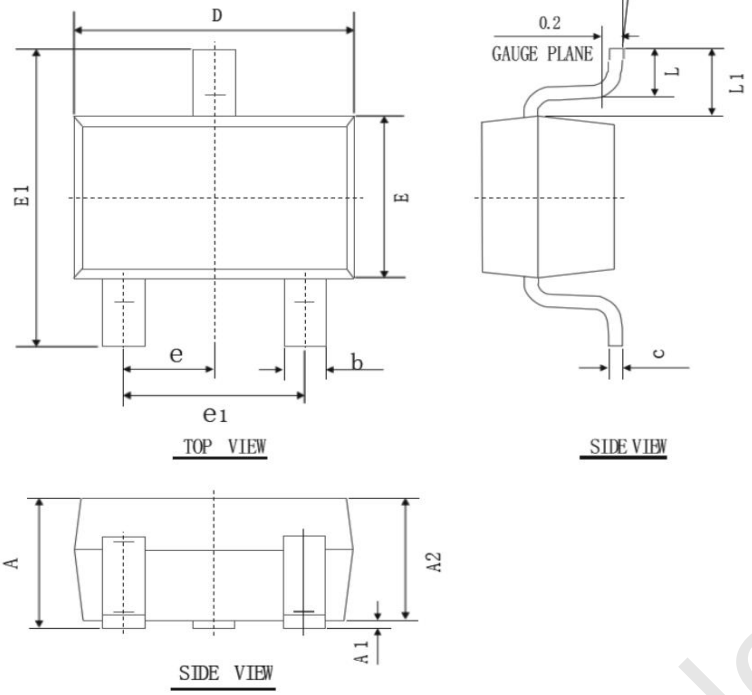


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(SOT-323-3L)



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	0.05	0.10
A2	0.90	0.95	1.00
b	0.20	0.25	0.30
c	0.08	0.10	0.15
e1	1.20	1.30	1.40
D	2.00	2.10	2.20
E	1.15	1.25	1.35
E1	2.15	2.30	2.45
L	0.26	0.36	0.46
θ	0°	4°	8°
L1	0.525 REF		
e	0.65 TYP		