Jan 2017

HRLT1B0N10K

100V N-Channel Trench MOSFET

Features

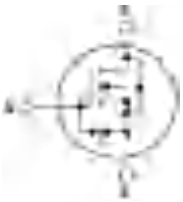
- ESD Protect
- Reliable and Rugged
- High Density Cell Design for Ultra Low $R_{DS(on)}$
- 100% Avalanche Tested
- RoHS Compliant

Key Parameters

Parameter	Value	Unit
BV_{DSS}	100	V
I_D	3.5	A
$R_{DS(on),\ typ\ @10V}$	85	mΩ
$R_{DS(on),\ typ\ @4.5V}$	100	mΩ

SOT-223

Symbol



Absolute Maximum Ratings

T_J=25℃ unless otherwise specified

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		100	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D	Drain Current	T_A = 25℃	3.5	A
		T_A = 70℃	2.8	A
I_{DM}	Pulsed Drain Current		14	A
E_{AS}	Single Pulsed Avalanche Energy	L=1mH	21	mJ
P_D	Power Dissipation	T_A = 25℃	2.1	W
		T_A = 70℃	1.3	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Thermal Resistance Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Junction-to-Ambient (1 in^2 pad of 2 oz copper), Max.	60	℃/W

Electrical Characteristics T_J=25 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
On Characteristics						
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1.5	--	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 3.5 A	--	85	105	mΩ
		V_{GS} = 4.5 V, I_D = 2.0 A	--	100	140	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 3.5 A	--	12	--	S
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0	--	--	1	μA
		V_{DS} = 80 V, T_J = 85℃	--	--	30	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±16 V, V_{DS} = 0 V	--	--	±10	μA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1.0 MHz	--	970	--	pF
C_{oss}	Output Capacitance		--	52	--	pF
C_{rss}	Reverse Transfer Capacitance		--	32	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 50 V, I_D = 3.5 A, R_G = 25 Ω (Note 2,3)	--	17	--	ns
t_r	Turn-On Rise Time		--	24	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	85	--	ns
t_f	Turn-Off Fall Time		--	12	--	ns
$Q_{g(10V)}$	Total Gate Charge	V_{DS} = 80 V, I_D = 3.5 A, V_{GS} = 10 V (Note 2,3)	--	20	26	nC
$Q_{g(4.5V)}$	Total Gate Charge		--	10	--	nC
Q_{gs}	Gate-Source Charge		--	3.0	--	nC
Q_{gd}	Gate-Drain Charge		--	4.2	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	3.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	14	A
V_{SD}	Drain-Source Diode Forward Voltage	I_S = 3.5 A, V_{GS} = 0 V	--	--	1.1	V
trr	Reverse Recovery Time	I_S = 3.5 A, di_F/dt = 100 A/μs	--	36	--	ns
Qrr	Reverse Recovery Charge		--	50	--	nC

Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
3. Essentially Independent of Operating Temperature

Typical Characteristics

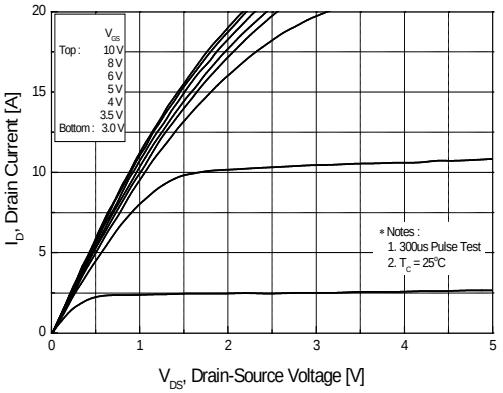


Figure 1. On Region Characteristics

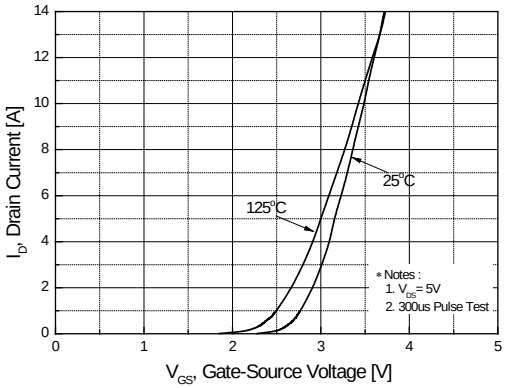


Figure 2. Transfer Characteristics

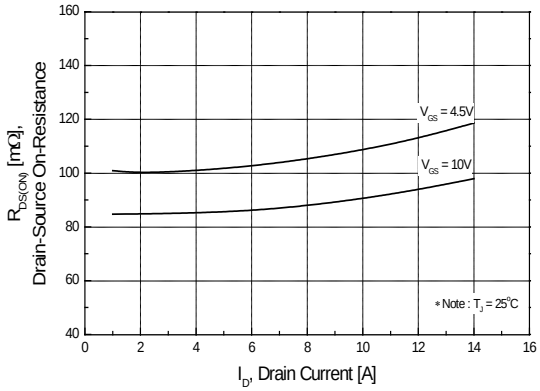


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

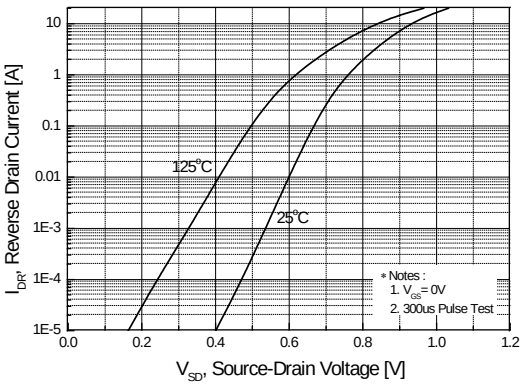


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

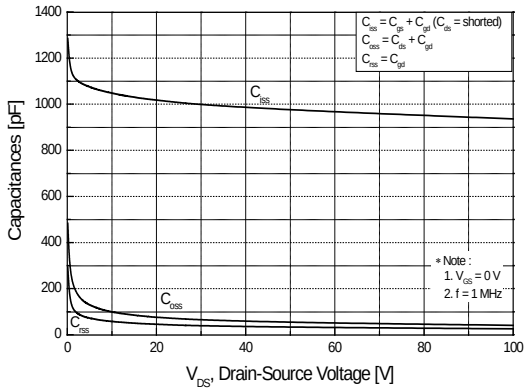


Figure 5. Capacitance Characteristics

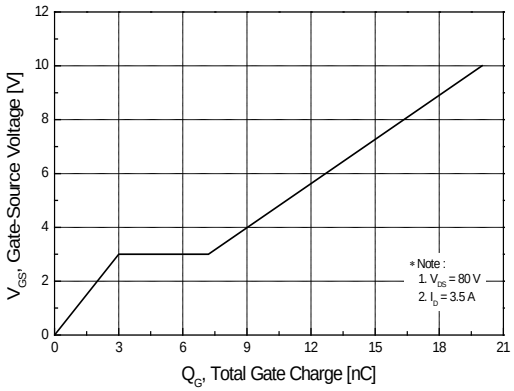


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

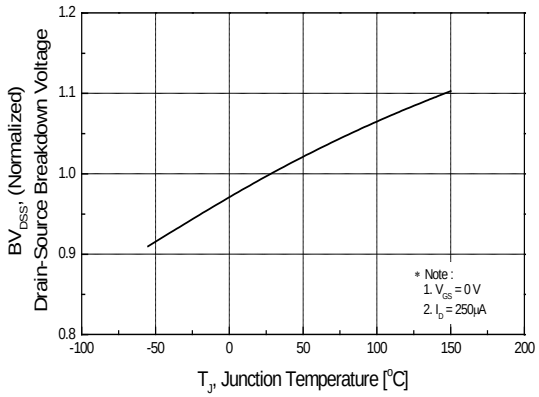


Figure 7. Breakdown Voltage Variation vs Temperature

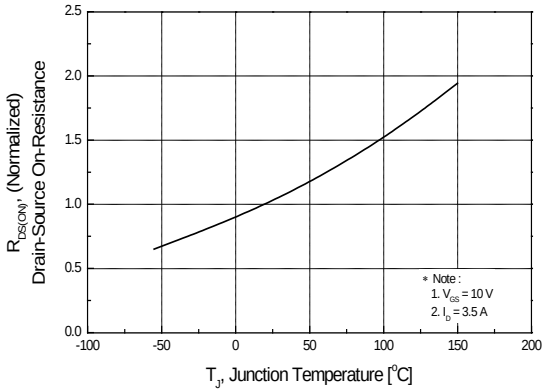


Figure 8. On-Resistance Variation vs Temperature

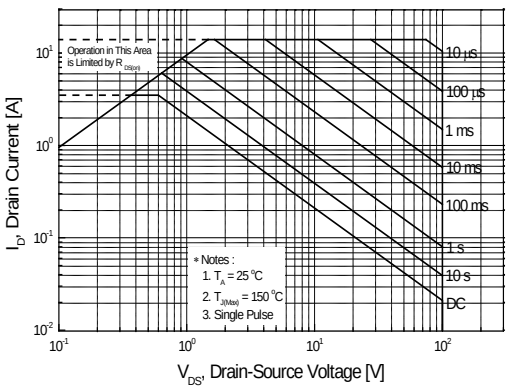


Figure 9. Maximum Safe Operating Area

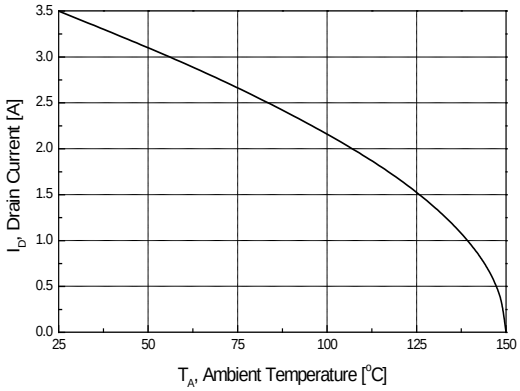


Figure 10. Maximum Drain Current vs Case Temperature

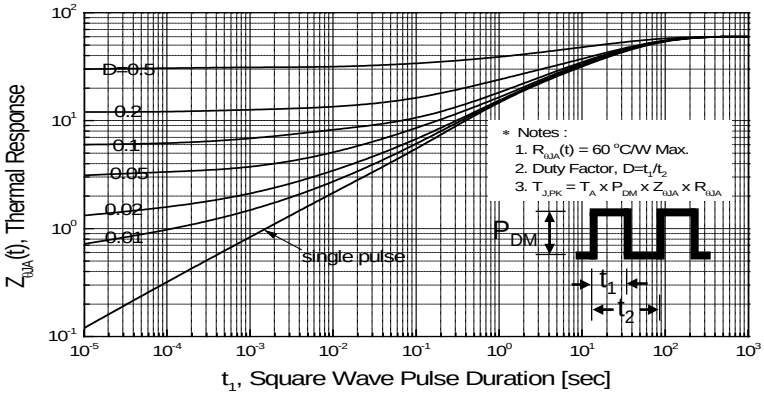


Figure 11. Transient Thermal Response Curve

Fig 12. Gate Charge Test Circuit & Waveform

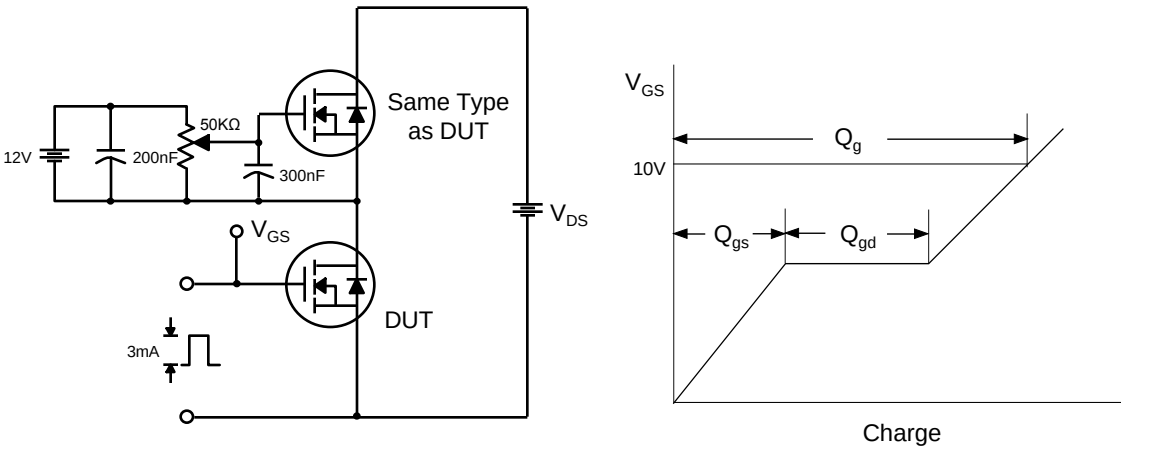


Fig 13. Resistive Switching Test Circuit & Waveforms

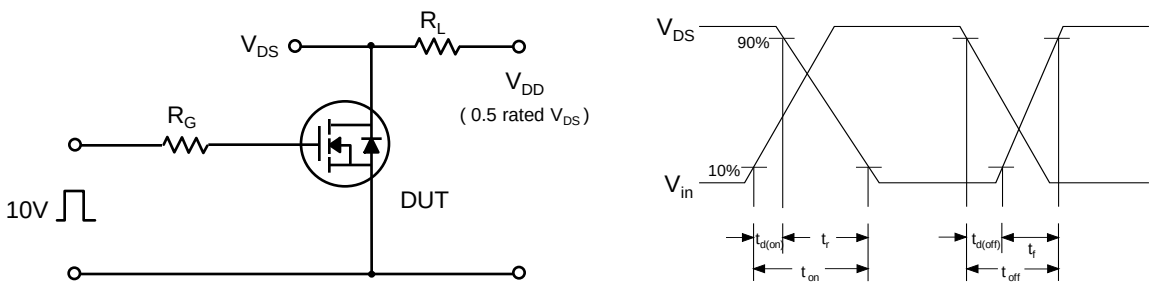


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

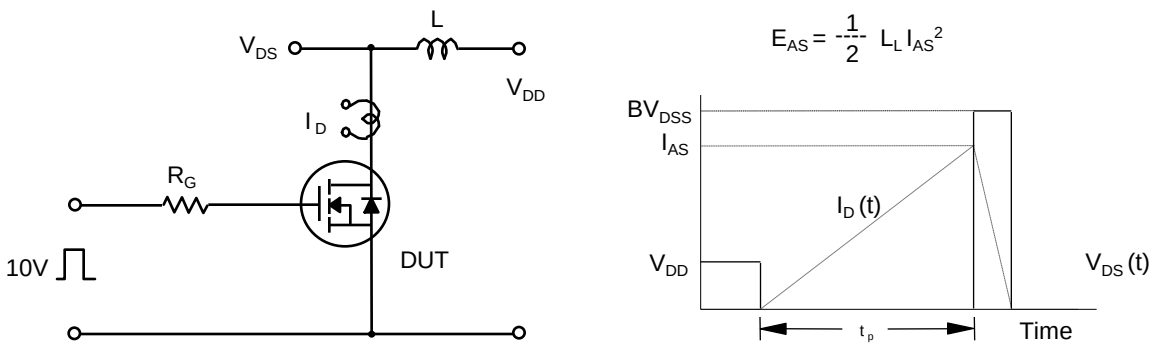
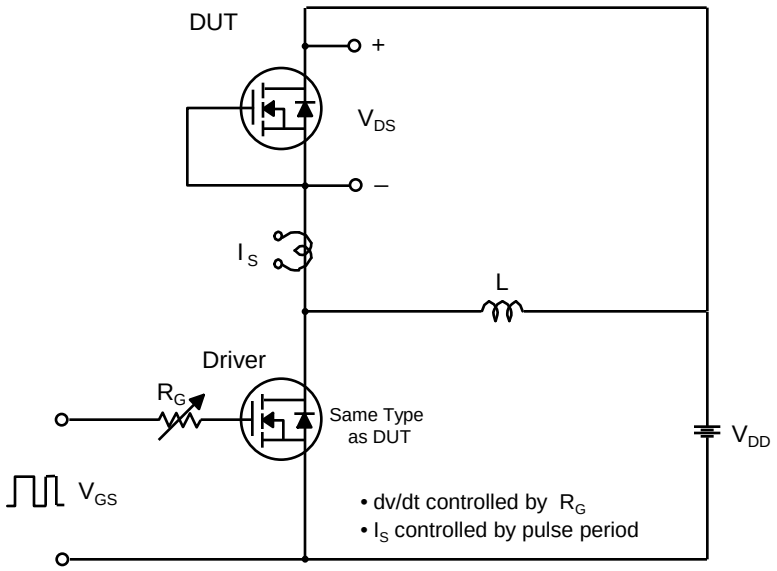
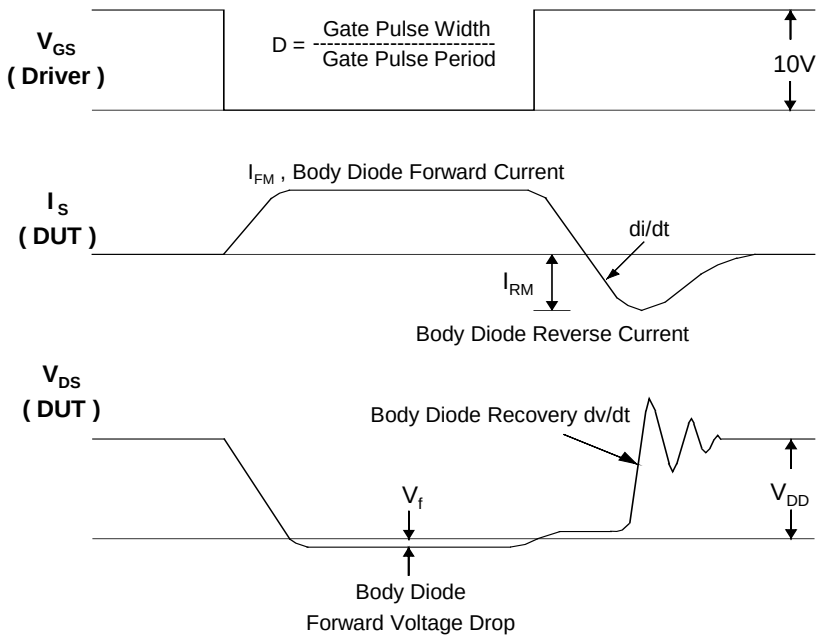


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Dimension

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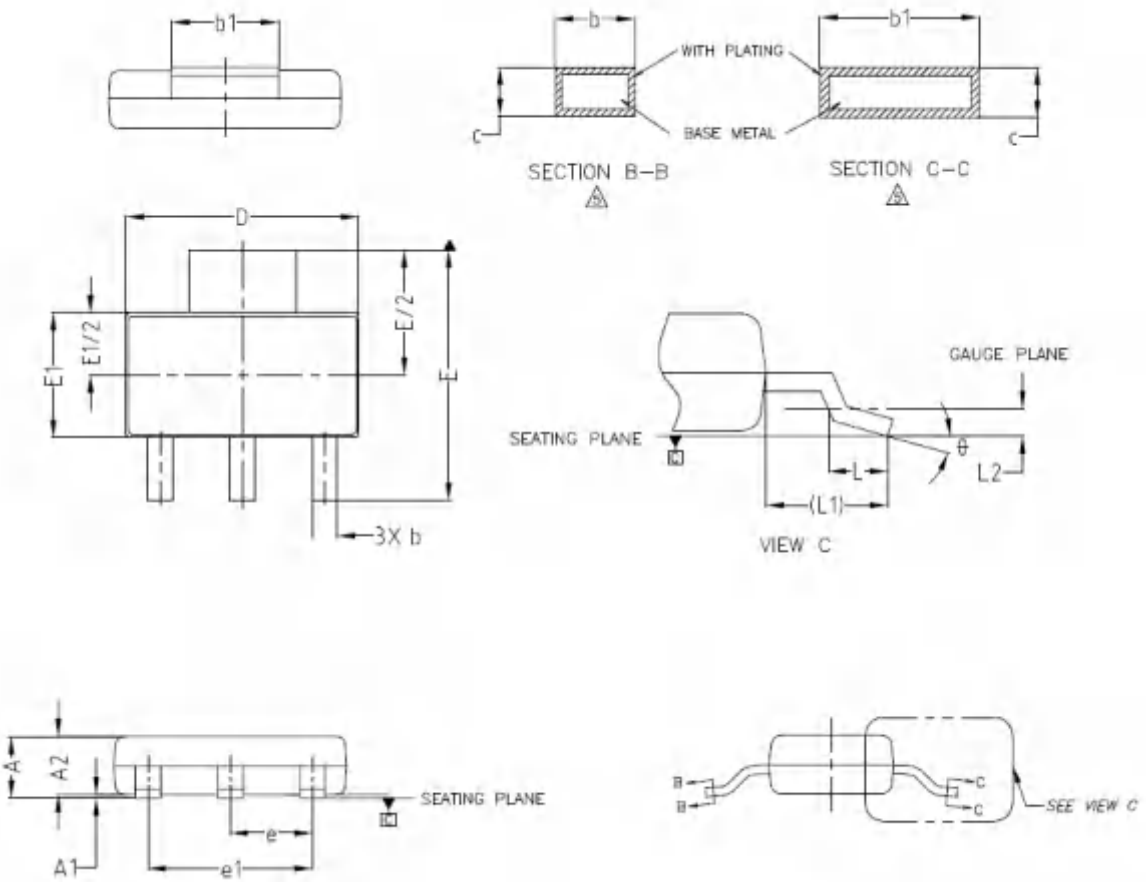

SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	—	—	1.80	
A1	0.02	—	0.10	
A2	1.60	1.65	1.70	
b	0.66	—	0.76	5
b1	2.96	—	3.06	5
c	0.12	—	0.28	6
D	6.30	6.50	6.66	4,5
E	10.30	7.00	7.20	
E1	3.40	3.50	3.60	4,5
e	2.30 BSC			
e1	4.60 BSC			
L	0.75	—	0.95	
L1	1.75 REF			
L2	0.10 BSC			
θ	0°	—	10°	
θ1	5°	—	15°	