

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Product Summary

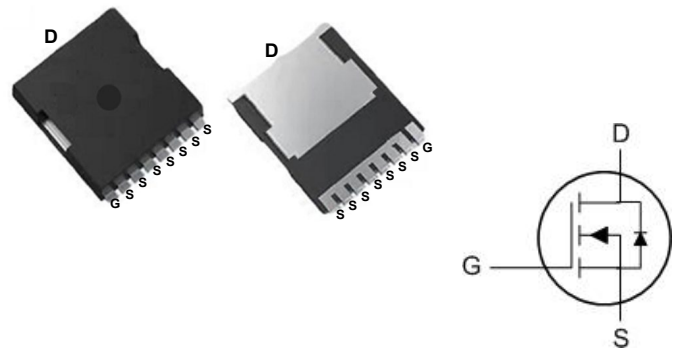


BVDSS	RDSON	ID
60V	1.25mΩ	400A

Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

TOLL-8L Pin Configuration

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

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	400	A
	$T_C = 100^\circ\text{C}$		268	
Pulsed Drain Current ¹		I_{DM}	1512	A
Single Pulse Avalanche Energy ²		EAS	500	mJ
Total Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	454.5	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	$R_{\theta JA}$	39	$^\circ\text{C/W}$
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	0.33	$^\circ\text{C/W}$

N-Ch 60V Fast Switching MOSFETs

Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	60	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS}	V _{DS} = 60V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C			-	-	100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2	2.9	4	V
Drain-Source on-Resistance ⁴		R _{DS(on)}	V _{GS} = 10V, I _D = 20A	-	1.25	1.55	mΩ
Forward Transconductance ⁴		g _{fs}	V _{DS} =10V, I _D =20A	-	62	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = 30V, V _{GS} =0V, f =1MHz	-	5990	-	pF
Output Capacitance		C _{oss}		-	2257	-	
Reverse Transfer Capacitance		C _{rss}		-	86	-	
Gate Resistance		R _g	f =1MHz	-	2.6	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = 10V, V _{DS} = 30V, I _D =20A	-	102	-	nC
Gate-Source Charge		Q _{gs}		-	24.6	-	
Gate-Drain Charge		Q _{gd}		-	28.2	-	
Turn-on Delay Time		t _{d(on)}	V _{GS} =10V, V _{DD} =30V, R _G = 3Ω, I _D = 20A	-	15.6	-	ns
Rise Time		t _r		-	29	-	
Turn-off Delay Time		t _{d(off)}		-	63	-	
Fall Time		t _f		-	51	-	
Body Diode Reverse Recovery Time		t _{rr}	I _F = 20A, dI/dt=100A/μs	-	80	-	ns
Body Diode Reverse Recovery Charge		Q _{rr}		-	114	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = 20A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	T _C =25°C	I _S	-	-	-	400	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 175^\circ\text{C}$.
2. The test condition is $V_{DD} = 90V, V_{GS} = 10V, L = 0.4\text{mH}, I_{AS} = 50A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

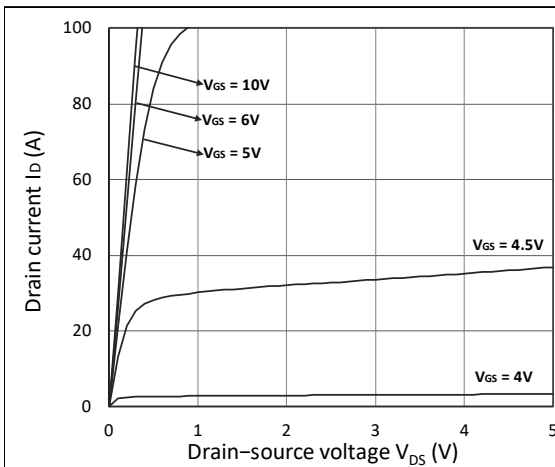


Figure 1. Output Characteristics

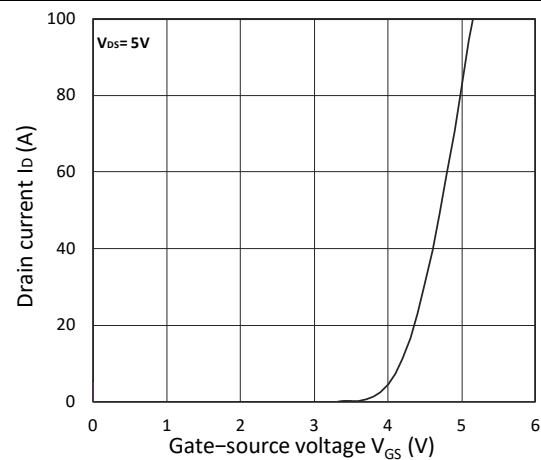


Figure 2. Transfer Characteristics

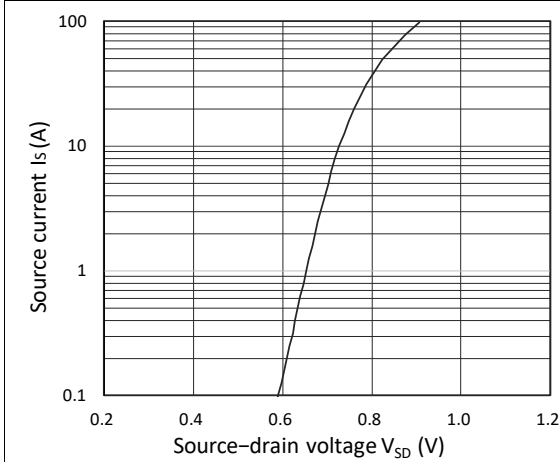


Figure 3. Forward Characteristics of Reverse

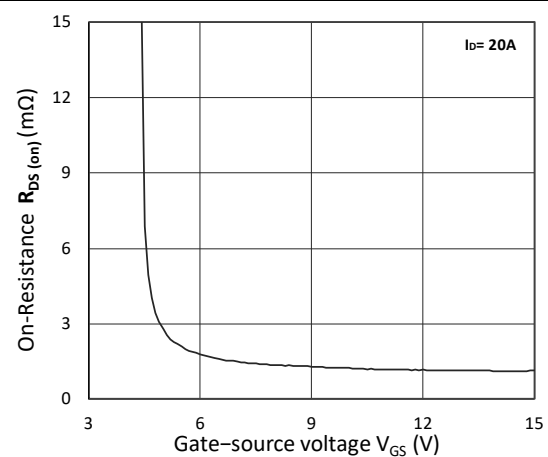


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

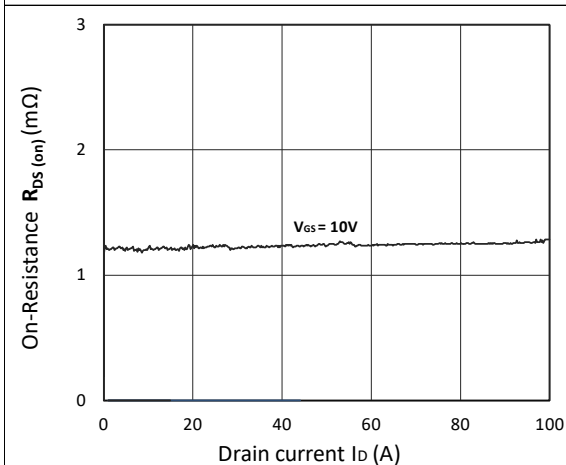


Figure 5. $R_{DS(ON)}$ vs. I_D

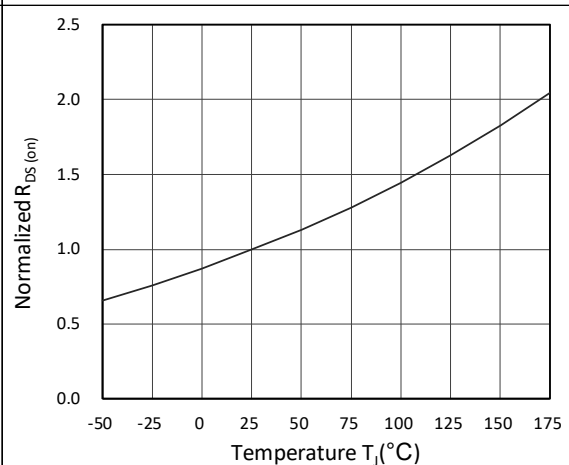


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature

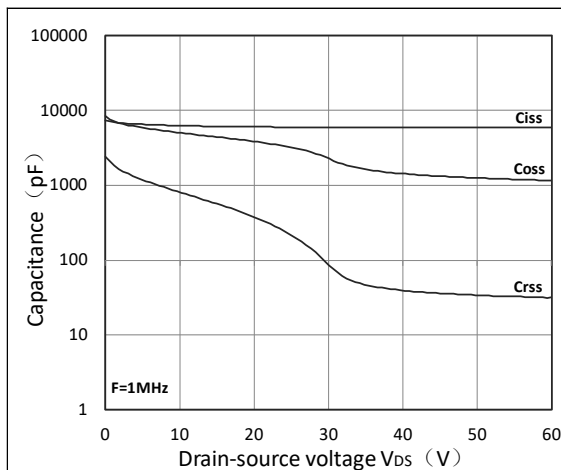


Figure 7. Capacitance Characteristics

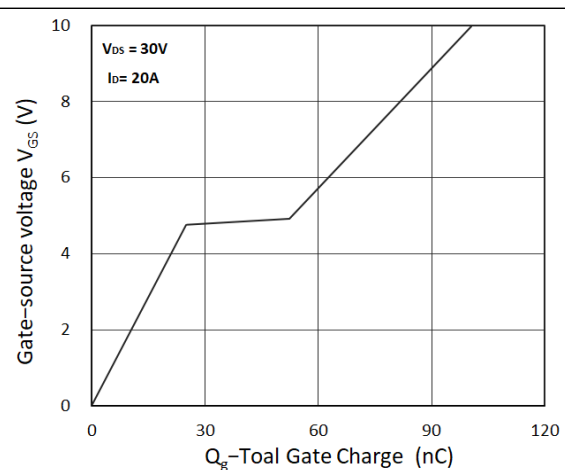


Figure 8. Gate Charge Characteristics

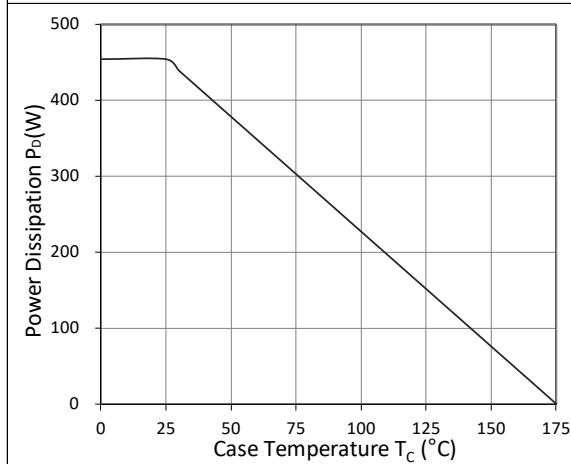


Figure 9. Power Dissipation

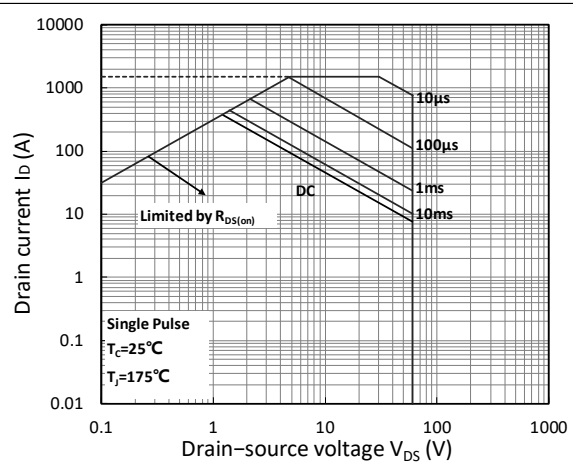


Figure 10. Safe Operating Area

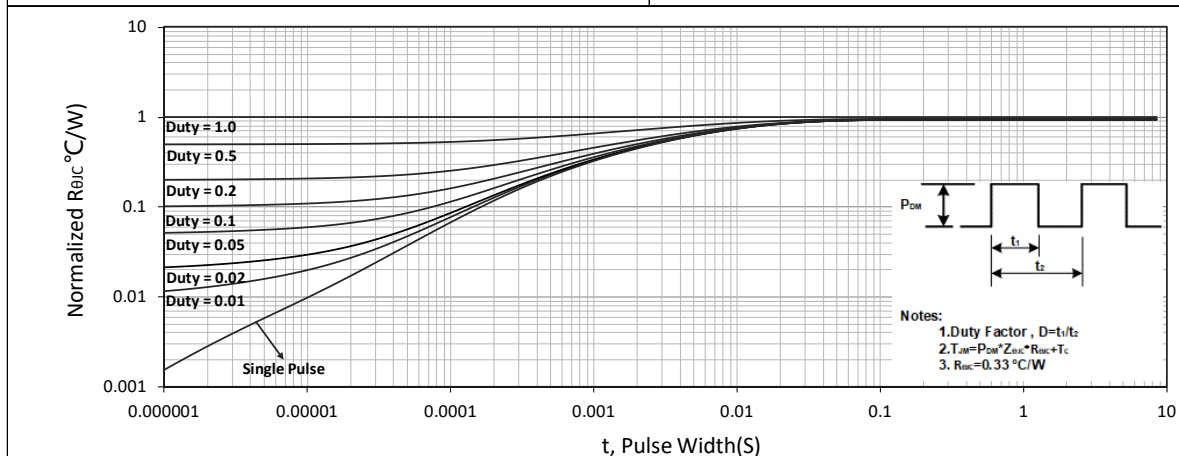


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

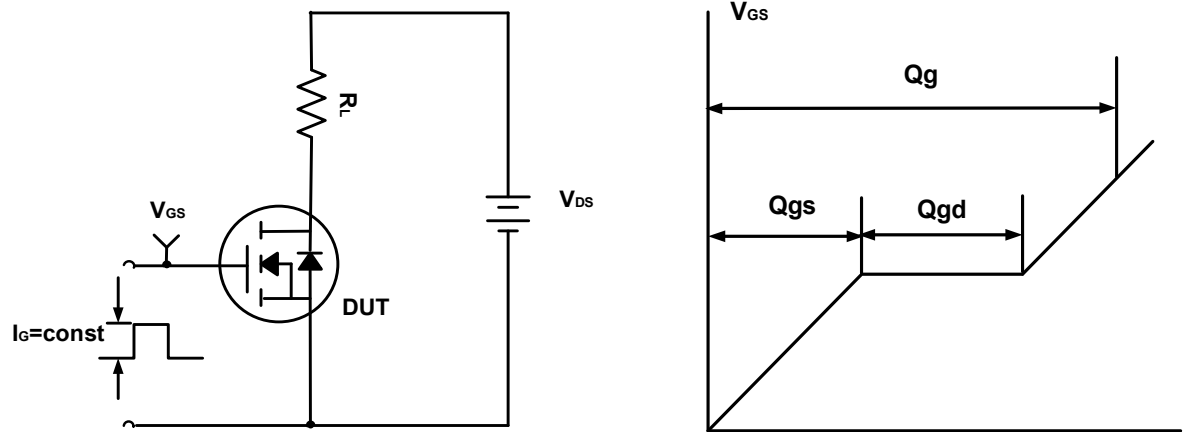


Figure A. Gate Charge Test Circuit & Waveforms

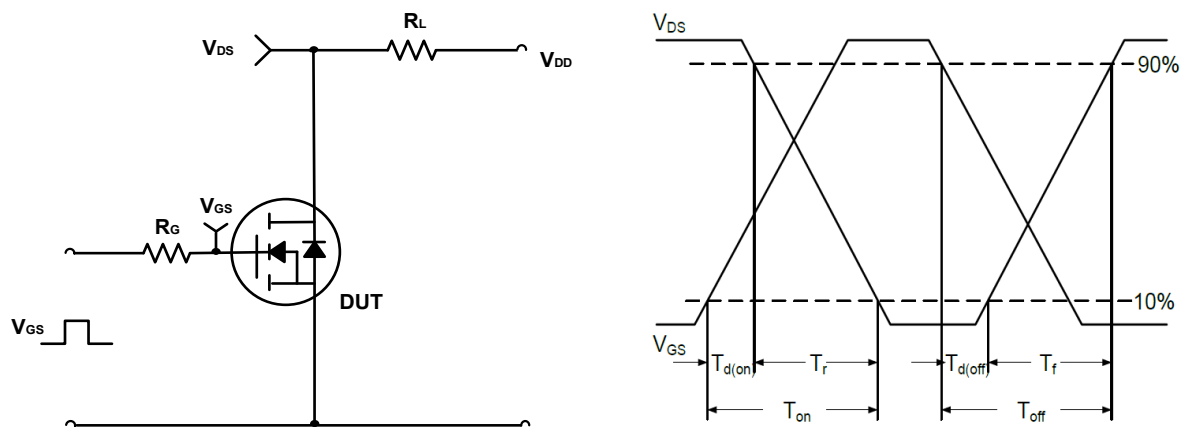


Figure B. Switching Test Circuit & Waveforms

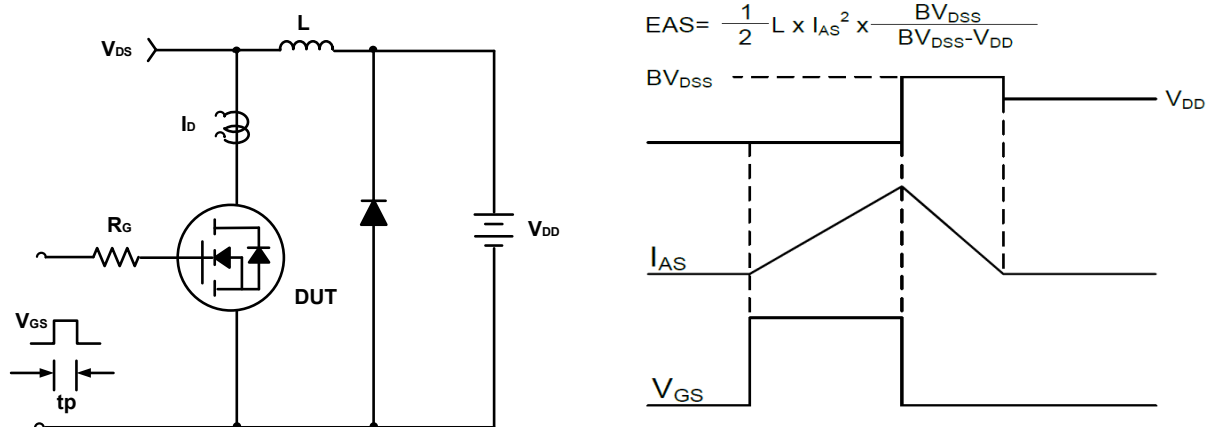
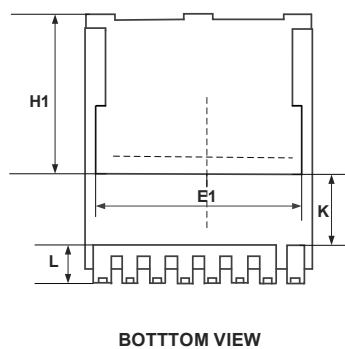
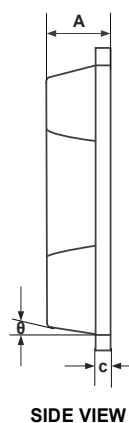
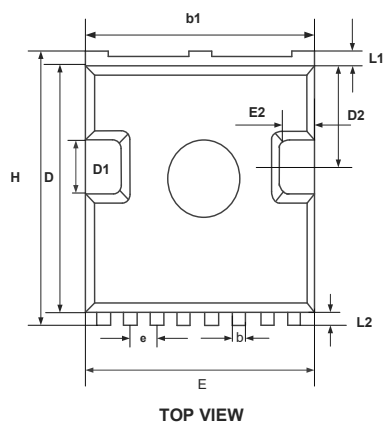


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for TOLL-8L



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.20	2.40
b	0.60	0.90
b1	9.70	9.90
c	0.40	0.60
D	10.20	10.60
D1	3.10	3.50
D2	4.45	4.75
E	9.70	10.10
E1	7.80BSC	
E2	0.50	0.70
e	1.200 BSC	
H	11.45	11.90
H1	6.75 BSC	
K	3.10 REF	
L	1.70	2.10
L1	0.60	0.80
L2	0.50	0.70
θ	10° REF	