

N-Channel 40V(D-S) MOSFET

Product summary		
V_{DS}	40	V
$R_{DS(ON)}$ (at $V_{GS}=10V$) Typ.	1.0	m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$) Typ.	1.4	m Ω
I_D ($T_c=25^\circ C$)	250	A

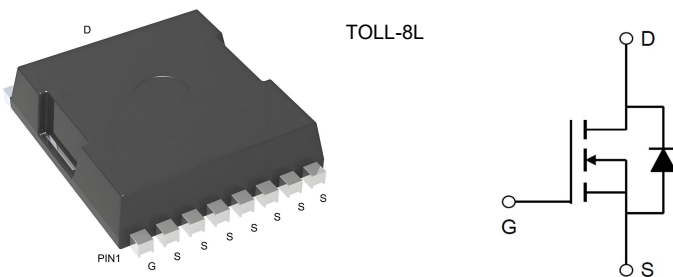
Features

- Advanced Split Gate Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge

Applications

- Load switching
- PWM Application
- Power Management

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECHB250N04G	TOLL-8L	13"	2000pcs

Absolute Maximum Ratings (at $T_A=25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		40	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D	Continuous Drain Current	$T_C=25^\circ C$	250	A
		$T_C=100^\circ C$	158	A
I_{DM}	Pulse Drain Current Tested ^A		1000	A
E_{AS}	Single Pulse Avalanche Energy ^B		506	mJ
P_D	Power Dissipation @ $T_C=25^\circ C$		131	W
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JC}$	Thermal Resistance-Junction to case max	0.95	$^\circ C/W$

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.65	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^C	$V_{GS}=10V, I_D=20A$	--	1.0	1.3	m Ω
		$V_{GS}=4.5V, I_D=20A$	--	1.4	1.8	m Ω
V_{SD}	Diode Forward Voltage	$I_S=30A, V_{GS}=0V$	--	--	1.2	V
Dynamic Parameters ^D						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=20V$ $f=1\text{MHz}$	--	6030	--	pF
C_{oss}	Output Capacitance		--	2020	--	pF
C_{rss}	Reverse Transfer Capacitance		--	200	--	pF
Q_g	Total Gate Charge	$V_{DS}=32V, I_D=20A$ $V_{GS}=0 \text{ to } 10V$	--	99	--	nC
Q_{gs}	Gate-Source Charge		--	52	--	nC
Q_{gd}	Gate-Drain Charge		--	11.2	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=20V$ $R_{GEN}=2\Omega,$ $I_D=25A,$ $V_{GS}=10V$	--	19.2	--	ns
t_r	Turn-on Rise Time		--	106.8	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	214.3	--	ns
t_f	Turn-off Fall Time		--	74.3	--	ns

A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

B. EAS condition: starting $T_J=25^\circ\text{C}$, $R_G=25\Omega$, $V_{DD}=20V$, $V_G=10V$, $L=0.5\text{mH}$, $I_{AS}=45A$.

C. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$.

D. Guaranteed by design, not subject to production testing.

Test Circuit

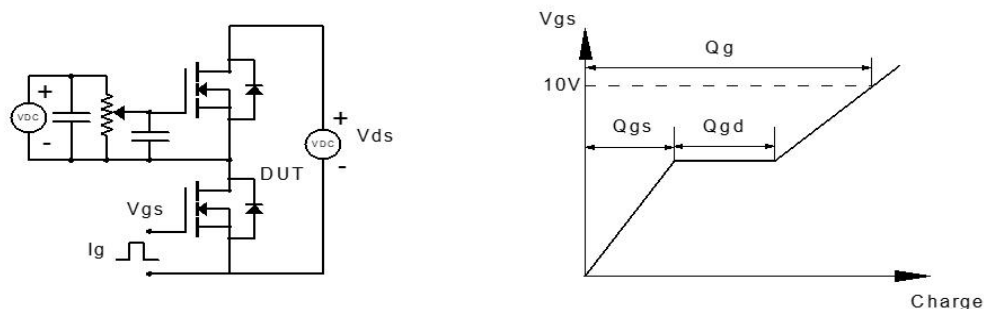


Figure 1: Gate Charge Test Circuit & Waveform

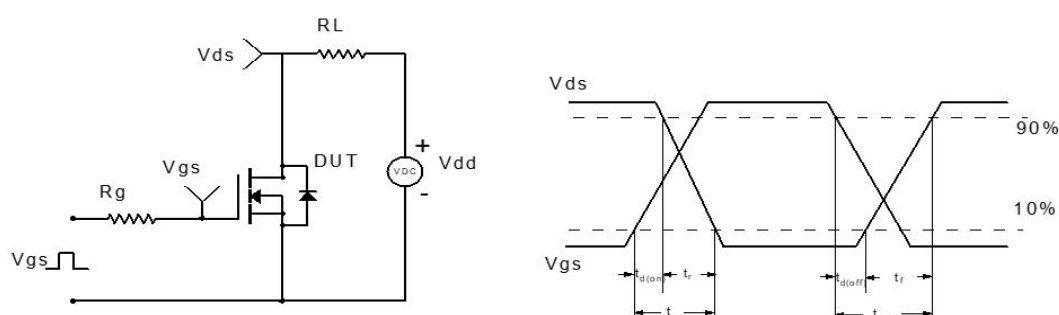


Figure 2: Resistive Switching Test Circuit & Waveform

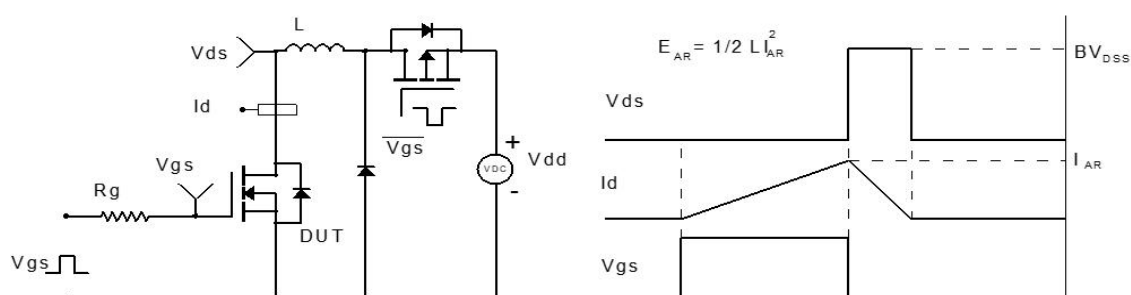


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

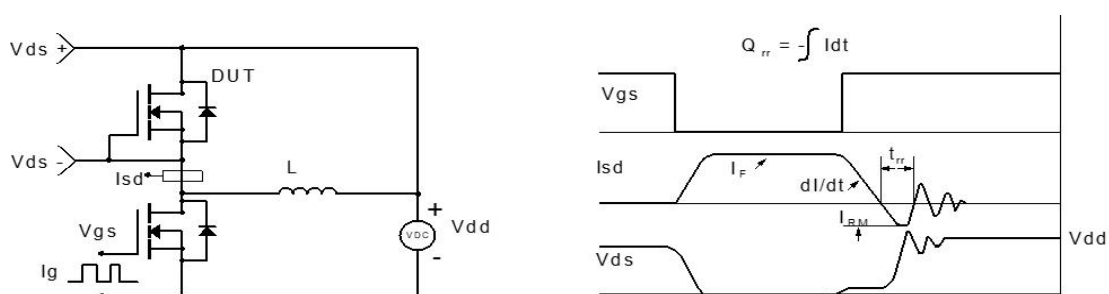
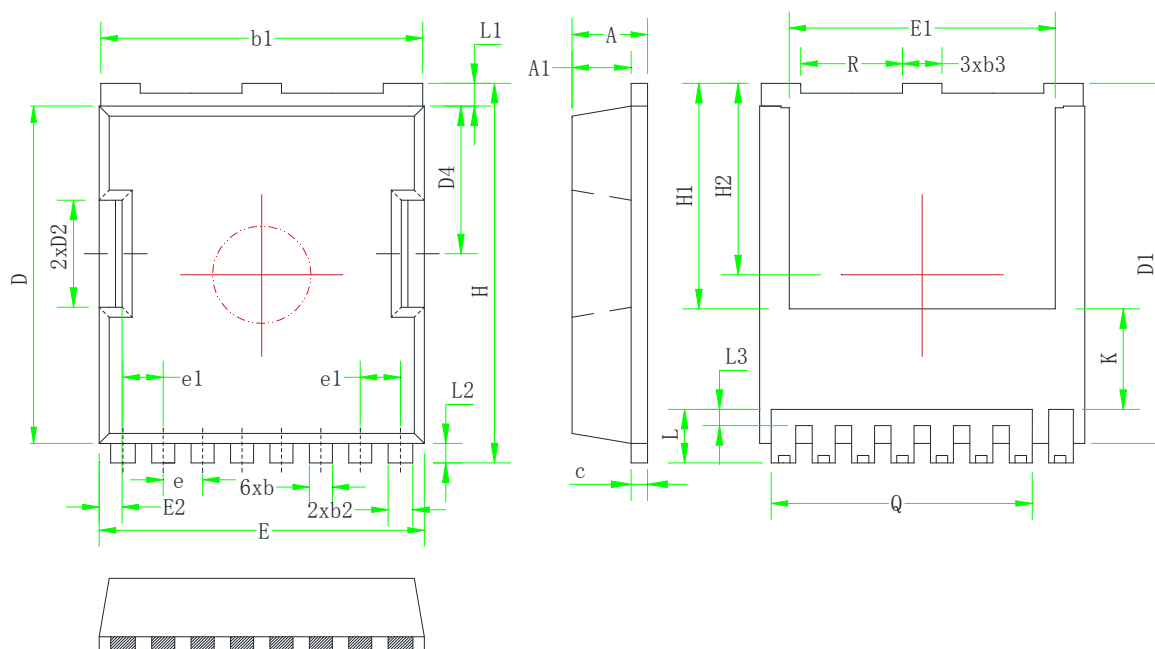


Figure 4: Diode Recovery Test Circuit & Waveform

TOLL-8L Package Information (unit:mm)



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E	9.85	9.90	9.95
A1	1.75	1.80	1.85	E1	8.00	8.10	8.20
b	0.65	0.70	0.75	E2	0.65	0.70	0.75
b1	9.75	9.80	9.85	H	11.60	11.70	11.80
b2	0.70	0.75	0.80	H1	6.95 BSC		
b3	1.15	1.20	1.25	H2	5.90 BSC		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
D1	11.00	11.10	11.20	L1	0.65	0.70	0.75
D2	3.25	3.30	3.35	L2	0.50	0.60	0.70
D4	4.50	4.55	4.60	L3	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
e1	1.225 BSC			R	3.00	3.10	3.20