

General Description

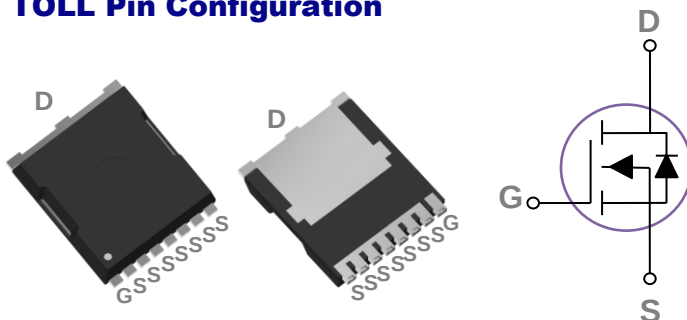
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDS(ON)	ID
40V	0.65mΩ	300A

Features

- 40V,300A, $R_{DS(ON)} = 0.65m\Omega$ @ $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TOLL Pin Configuration



Applications

- Motor Driver
- Load Switch
- Power Tools

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	300	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	192	A
I_{DM}	Drain Current – Pulsed ¹	1200	A
EAS	Single Pulse Avalanche Energy ²	1414	mJ
IAS	Single Pulse Avalanche Current ²	168	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	347	W
	Power Dissipation – Derate above 25°C	2.78	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.36	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	40	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=85^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=20A$	---	0.55	0.65	m Ω
		$V_{GS}=4.5V$, $I_D=10A$	---	0.77	1	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.2	1.6	2.5	V

Dynamic and switching Characteristics³

Q_g	Total Gate Charge	$V_{DS}=20V$, $V_{GS}=10V$, $I_D=80A$	---	210	315	nC
			---	110	165	
Q_{gs}	Gate-Source Charge	$V_{DS}=20V$, $V_{GS}=4.5V$, $I_D=80A$	---	19	30	
Q_{gd}	Gate-Drain Charge		---	50	75	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V$, $V_{GS}=10V$, $R_G=6\Omega$ $I_D=80A$	---	30	45	ns
T_r	Rise Time		---	40	60	
$T_{d(off)}$	Turn-Off Delay Time		---	80	120	
T_f	Fall Time		---	110	165	
C_{iss}	Input Capacitance	$V_{DS}=20V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	9750	15000	pF
C_{oss}	Output Capacitance		---	3700	5600	
C_{rss}	Reverse Transfer Capacitance		---	500	750	
R_g	Gate resistance	$V_{GS}=0V$, $V_{DS}=0V$, $F=1\text{MHz}$	---	1	---	Ω

Guaranteed Avalanche Energy

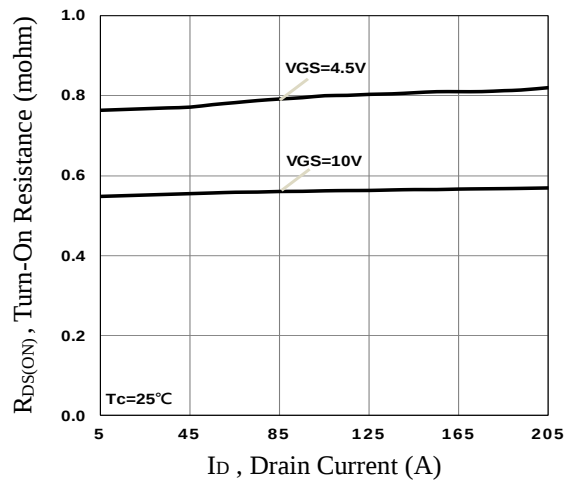
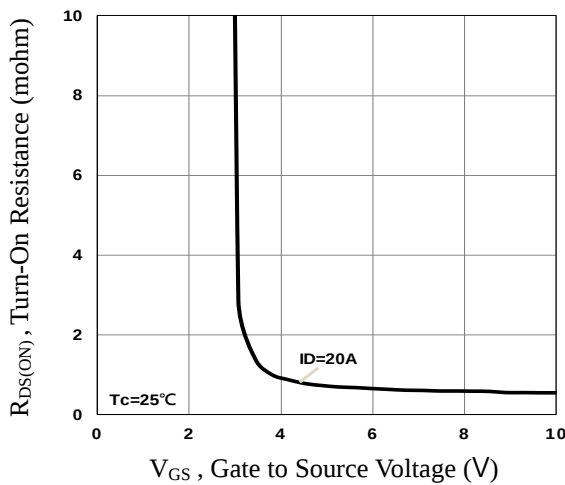
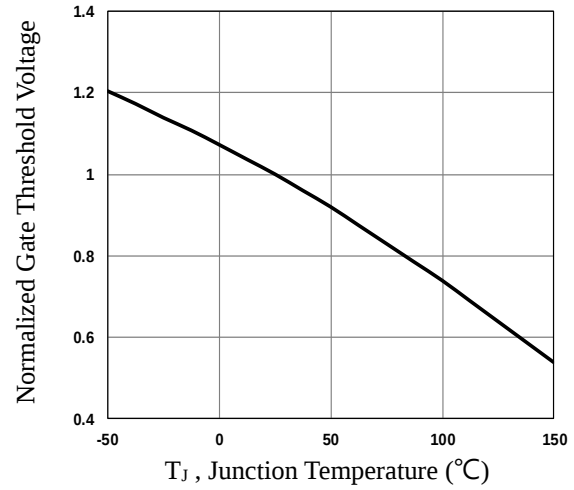
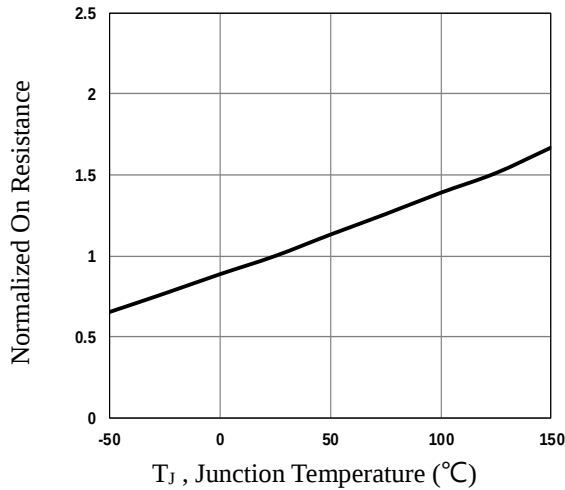
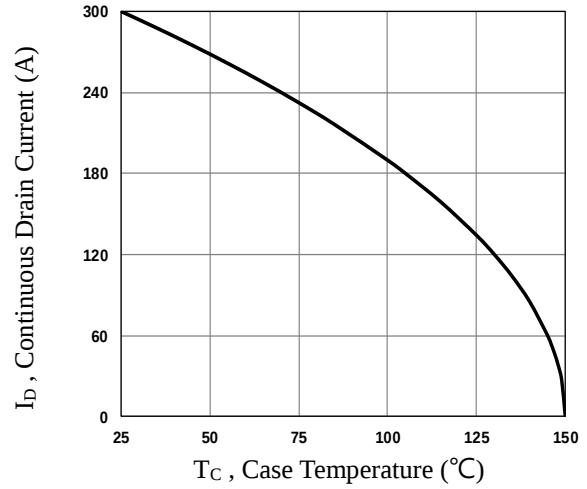
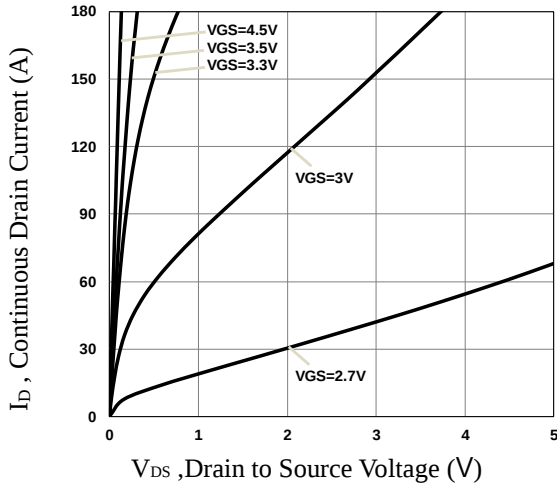
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V$, $L=0.1\text{mH}$, $I_{AS}=100A$	500	---	---	mJ

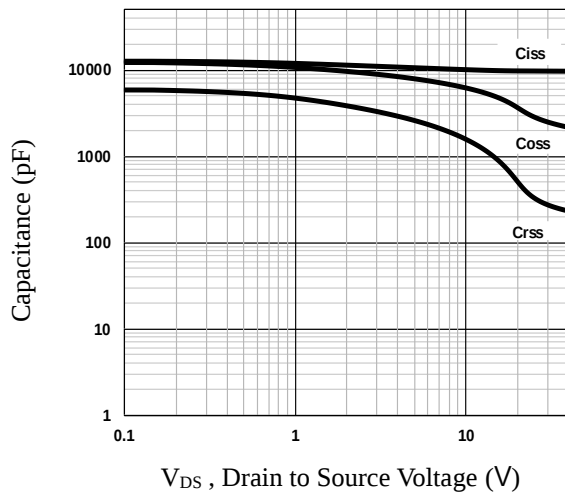
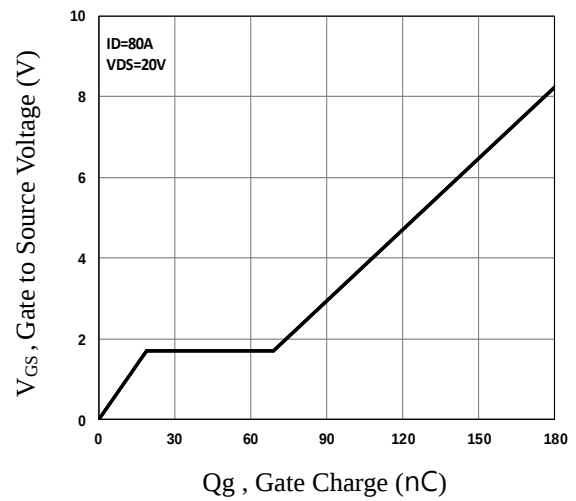
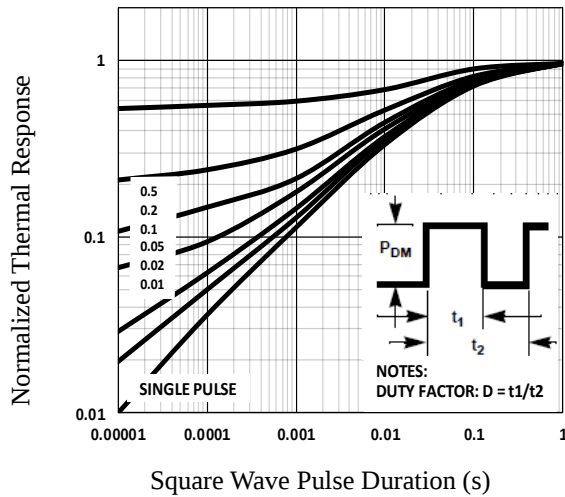
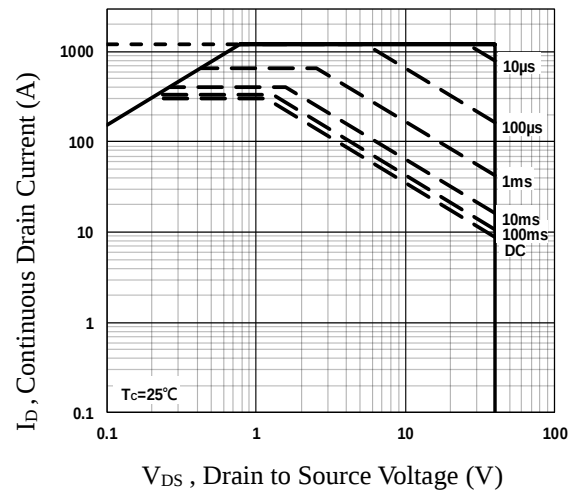
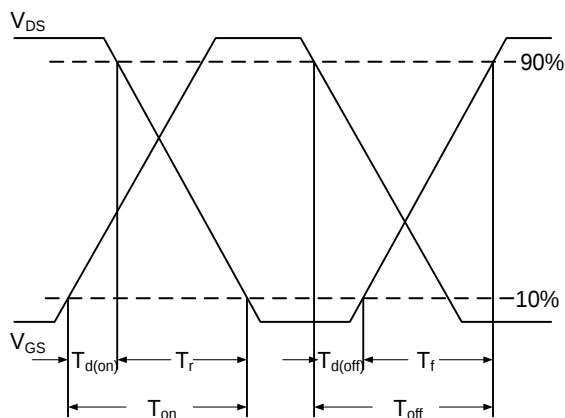
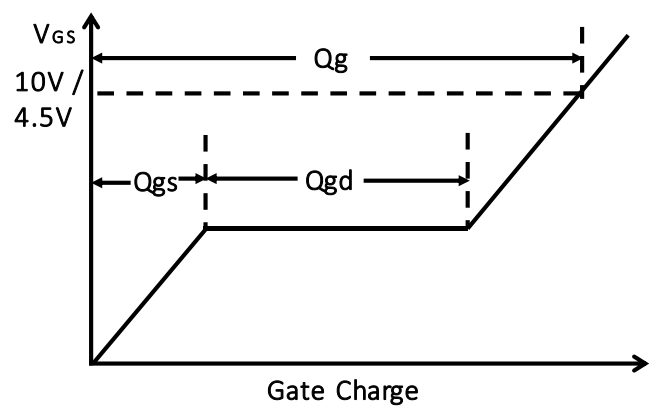
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	300	A
I_{SM}	Pulsed Source Current		---	---	600	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ\text{C}$	---	---	1	V
t_{rr}	Reverse Recovery Time	$V_R=30V$, $I_S=10A$	---	210	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	750	---	nC

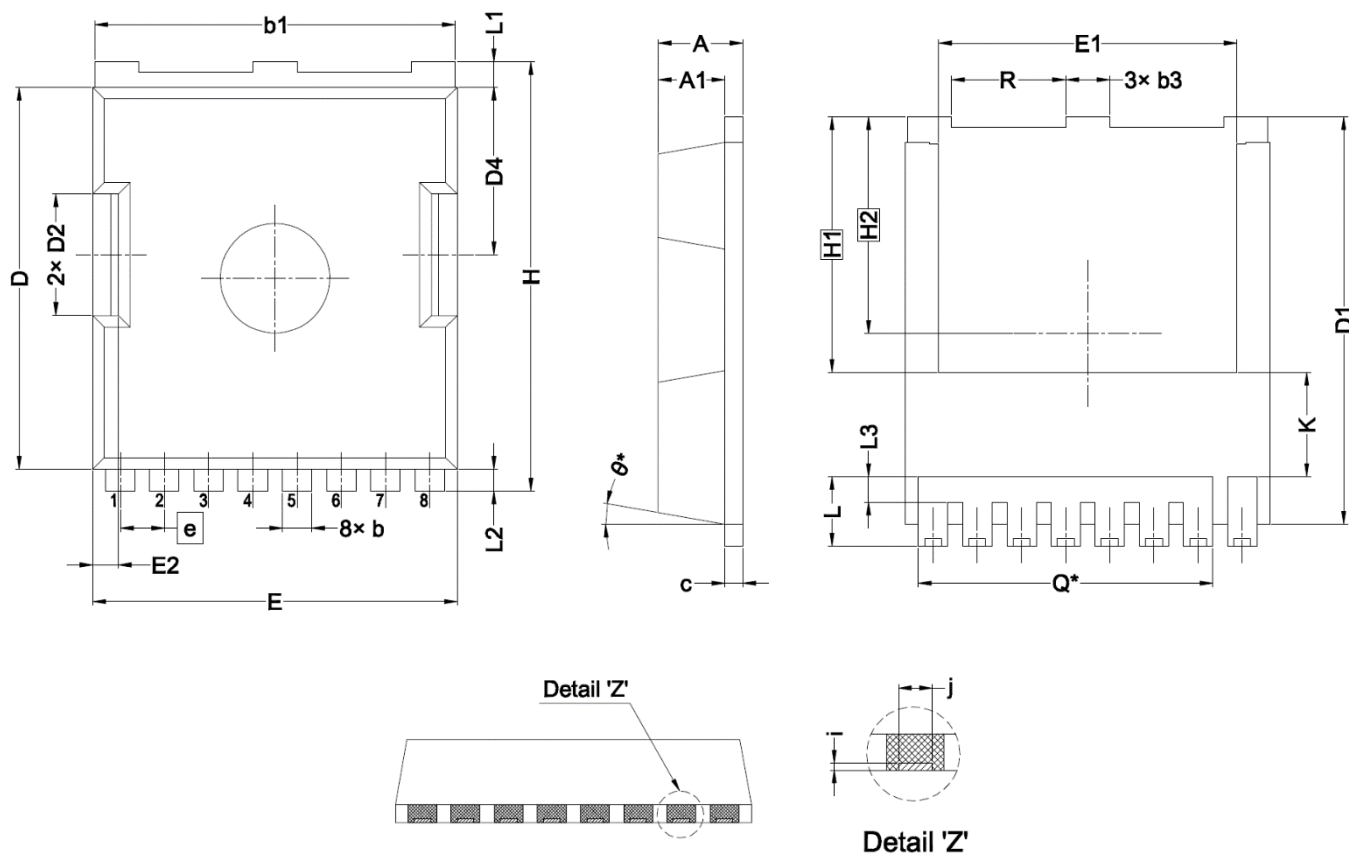
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V$, $V_{GS}=10V$, $L=0.1\text{mH}$, $I_{AS}=168A$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$..
3. Essentially independent of operating temperature.



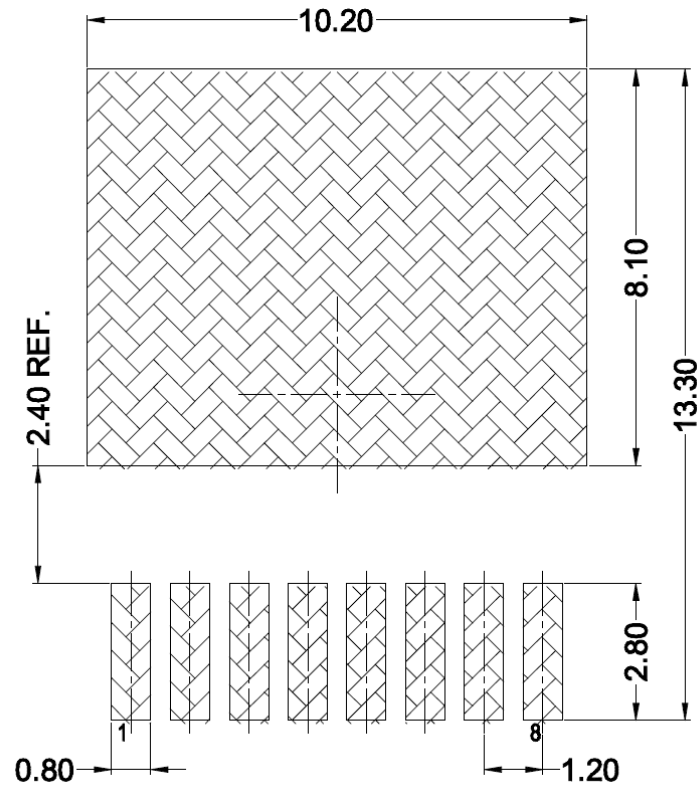

Fig.7 Capacitance Characteristics

Fig.8 Gate Charge Characteristics

Fig.9 Normalized Transient Impedance

Fig.10 Maximum Safe Operation Area

Fig.11 Switching Time Waveform

Fig.12 Gate Charge Waveform

TOLL PACKAGE INFORMATION



SYMBOL	mm			SYMBOL	mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	2.20	2.30	2.40	H	11.58	11.68	11.78
A1	1.70	1.80	1.90	H1	6.95 BSC		
b	0.70	0.80	0.90	H2	5.89 BSC		
b1	9.70	9.80	9.90	i	0.10 REF		
b3	1.10	1.20	1.30	j	0.46 REF		
c	0.40	0.50	0.60	K	2.80 REF		
D	10.28	10.38	10.48	L	1.40	1.90	2.10
D1	10.98	11.08	11.18	L1	0.60	0.70	0.80
D2	3.20	3.30	3.40	L2	0.50	0.60	0.70
D4	4.45	4.55	4.65	L3	0.30	0.70	0.80
E	9.80	9.90	10.00	N	8		
E1	8.00	8.10	8.20	Q	8.00 REF		
E2	0.60	0.70	0.80	R	3.00	3.10	3.20
e	1.20 BSC			theta	10° REF		

TOLL RECOMMENDED LAND PATTERN



unit : mm