

## General Description

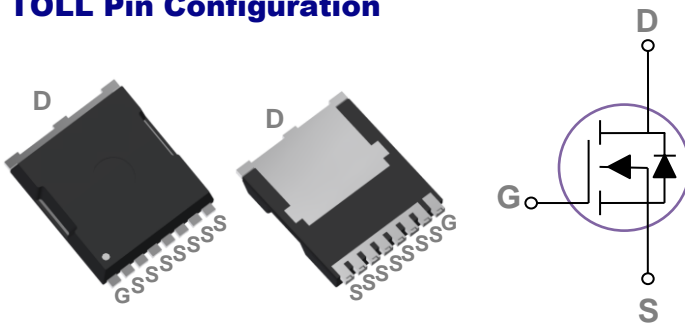
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
150V	5.2mΩ	165A

## Features

- 150V, 165A,  $R_{DS(ON)} = 5.2m\Omega @ V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

## TOLL Pin Configuration



## Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

## Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ C$ )	165	A
	Drain Current – Continuous ( $T_c=100^\circ C$ )	104	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	660	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	1350	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	52	A
$P_D$	Power Dissipation ( $T_c=25^\circ C$ )	430	W
	Power Dissipation – Derate above $25^\circ C$	3.44	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.29	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	150	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	μA
		V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =85°C	---	---	10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	4.4	5.2	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	2	3	4	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =3A	---	17	---	S

**Dynamic and switching Characteristics**

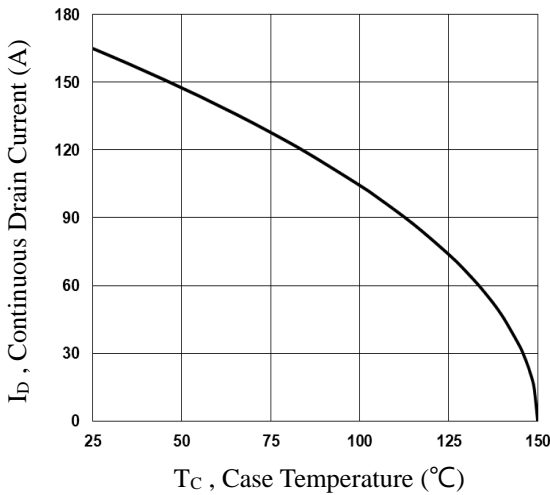
Q <sub>g</sub>	Total Gate Charge <sup>3,4</sup>	V <sub>DS</sub> =75V, V <sub>GS</sub> =10V, I <sub>D</sub> =80A	---	130	170	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3,4</sup>		---	36	55	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3,4</sup>		---	32	50	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3,4</sup>	V <sub>DD</sub> =75V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =80A	---	70	105	ns
T <sub>r</sub>	Rise Time <sup>3,4</sup>		---	205	310	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3,4</sup>		---	402	600	
T <sub>f</sub>	Fall Time <sup>3,4</sup>		---	197	300	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, F=1MHz	---	8525	12500	pF
C <sub>oss</sub>	Output Capacitance		---	700	1050	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	25	40	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2.7	---	Ω

**Drain-Source Diode Characteristics and Maximum Ratings**

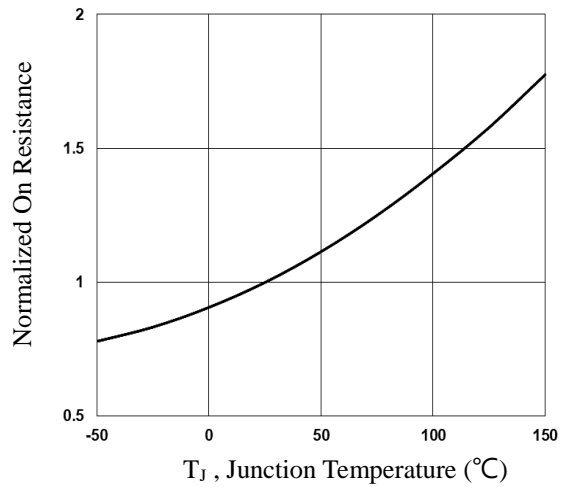
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	165	A
I <sub>SM</sub>	Pulsed Source Current		---	---	330	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>R</sub> =100V, I <sub>S</sub> =20A	---	135	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs, T <sub>J</sub> =25°C	---	730	---	nC

Note :

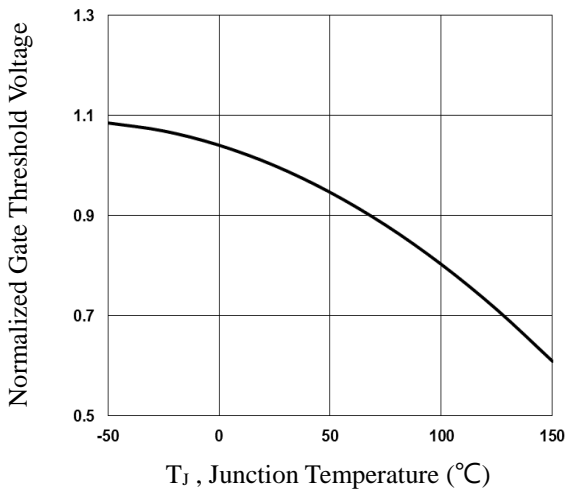
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=1mH, I<sub>AS</sub>=52A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



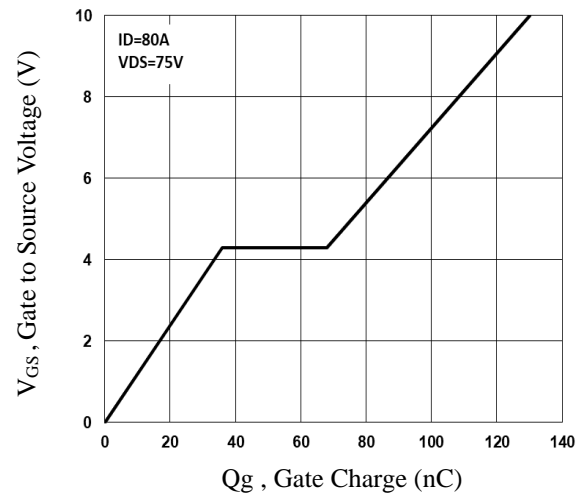
**Fig.1 Continuous Drain Current vs.  $T_c$**



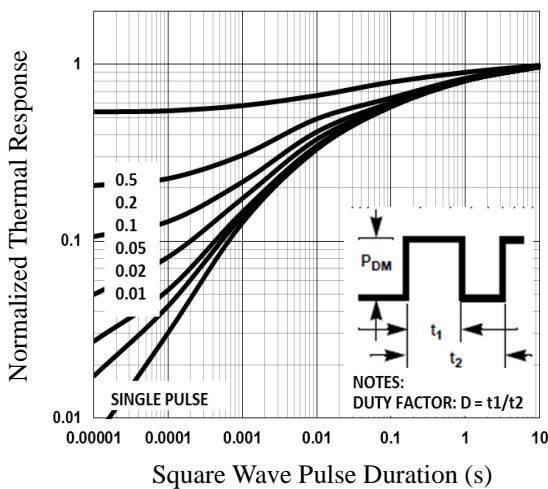
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



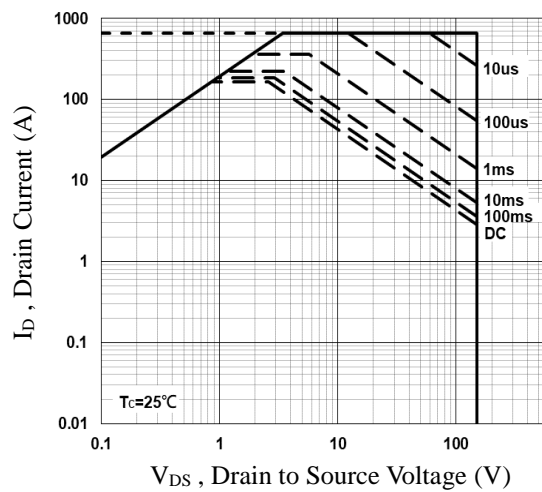
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



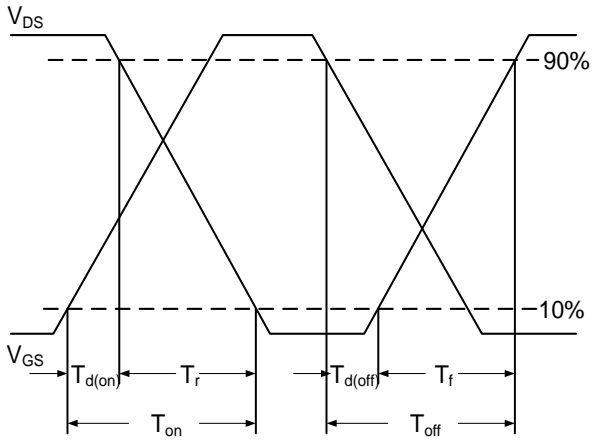
**Fig.4 Gate Charge Characteristics**



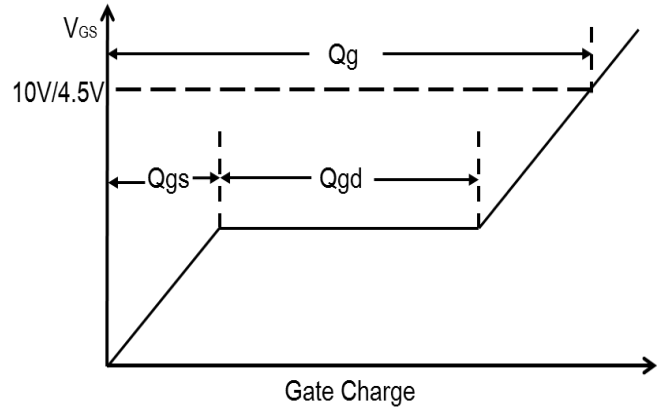
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

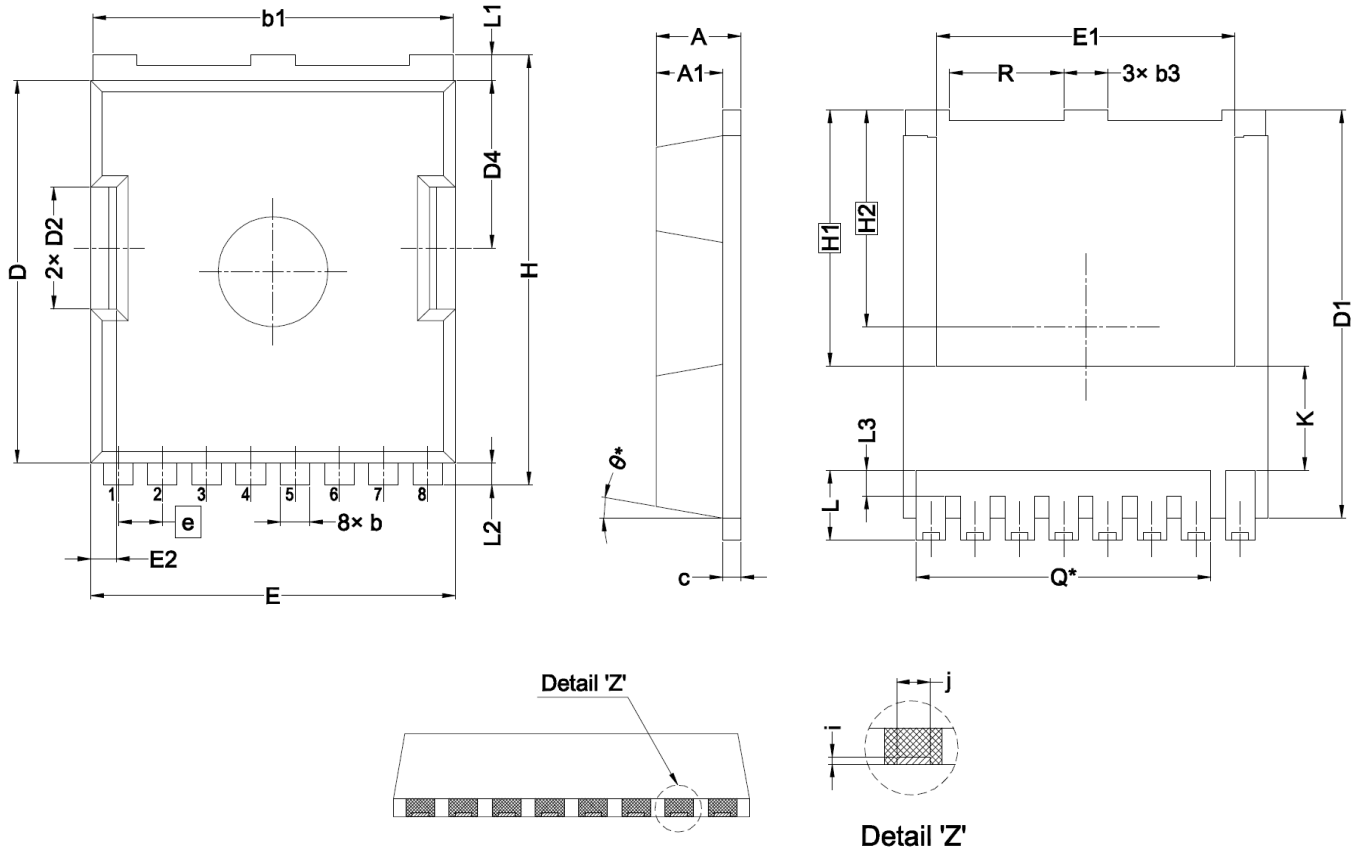


**Fig.7 Switching Time Waveform**



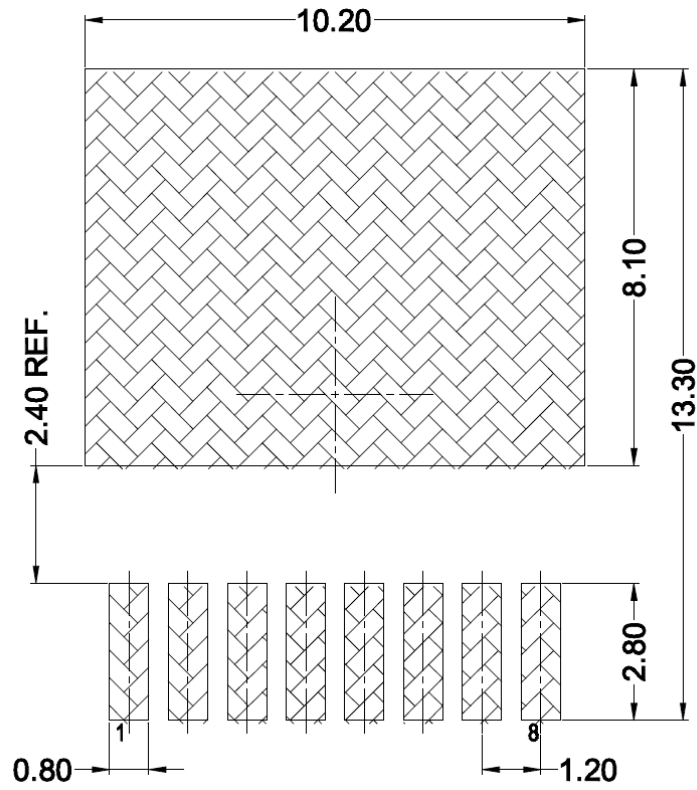
**Fig.8 Gate Charge Waveform**

**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