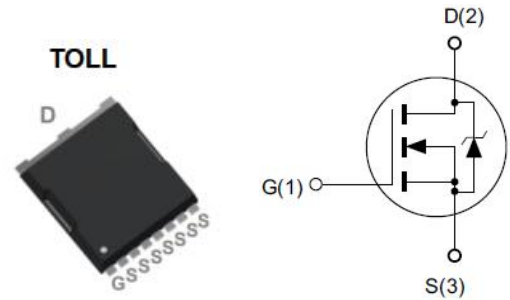


Features

- ◆ 650V, 30A, $R_{DS(ON)}(Typ.) = 90m\Omega @ V_{GS} = 10V$.
- ◆ Advanced Super junction Technology
- ◆ Low drain-source on-resistance
- ◆ Easy to control Gate switching



Application

- ◆ PFC stages, hard switching PWM stages
- ◆ Resonant switching PWM
- ◆ PC, Silver box, Adaptor, LCD & PDP TV, Lighting
- ◆ Server power, Telecom power and UPS application.

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

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_c = 25^\circ C$	30	A
I_{DM}	Drain Current-Pulsed ^b	90	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ C$	278	W
dv/dt	Peak Diode Recovery dv/dt ^c	50	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	1216	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.45	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	57	$^\circ C/W$

Electrical Characteristics $T_J = 25^\circ C$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	2	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	3.9	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 10A$	-	90	105	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_g	Gate Resistance	$f = 1.0MHz$	-	12.6	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 100V,$ $V_{GS} = 0V,$ $f = 10KHz$	-	2657	-	pF
C_{oss}	Output Capacitance		-	89	-	pF
C_{rss}	Reverse Transfer Capacitance		-	2	-	pF

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400V,$ $I_D = 19A,$ $V_{GS} = 10V,$ $R_G = 2.0\Omega$	-	29.6	-	ns
t_r	Turn-On Rise Time		-	31.3	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	94.6	-	ns
t_f	Turn-Off Fall Time		-	9.1	-	ns
Q_g	Total Gate Charge	$V_{DS} = 400V,$ $I_D = 19A,$ $V_{GS} = 0 \text{ to } 10V$	-	55.4	-	nC
Q_{gs}	Gate-Source Charge		-	15	-	nC
Q_{gd}	Gate-Drain Charge		-	20.2	-	nC

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_F = 1A$	-	0.67	-	V
T_{rr}	Body Diode Reverse Recovery Time	$I_F = 17A, V_R = 400V$ $di_F/dt = 100A/\mu s$	-	136	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 17A, V_R = 400V$ $di_F/dt = 100A/\mu s$	-	0.741	-	μC
I_{rrm}	Peak reverse recovery current	$I_F = 17A, V_R = 400V$ $di_F/dt = 100A/\mu s$	-	10.28	-	A

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 10mH, V_{DD} = 50V, I_{AS} = 15.6A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$

■ Characteristic Curve

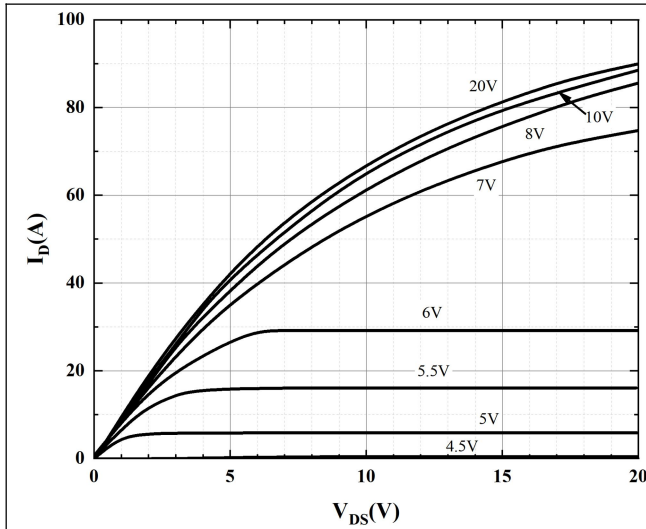


Figure 1. Typical Output Characteristics

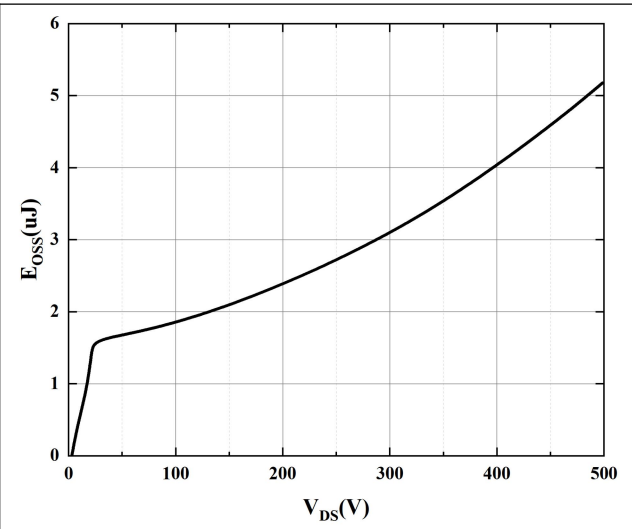


Figure 2. Typical C_{oss} Stored Energy

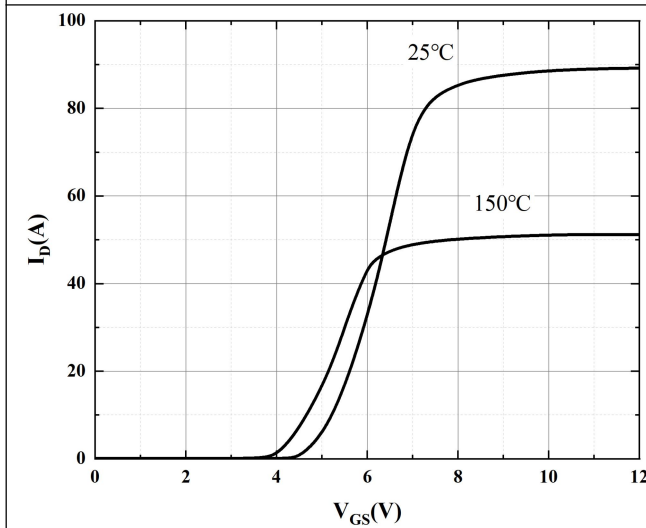


Figure 3. Typical Transfer Characteristics

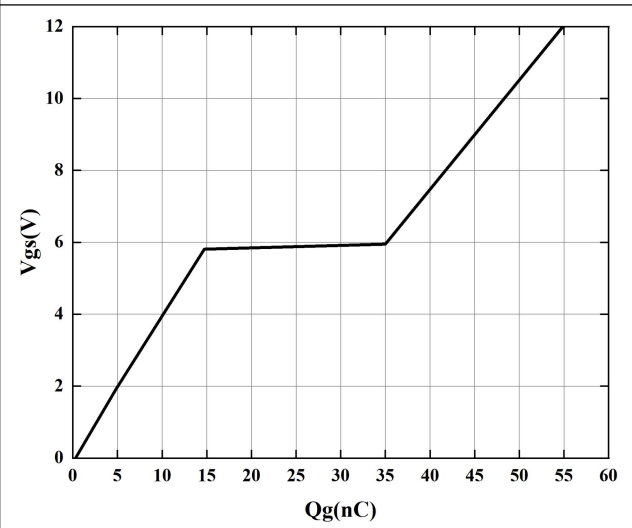


Figure 4. Gate-Charge Characteristics

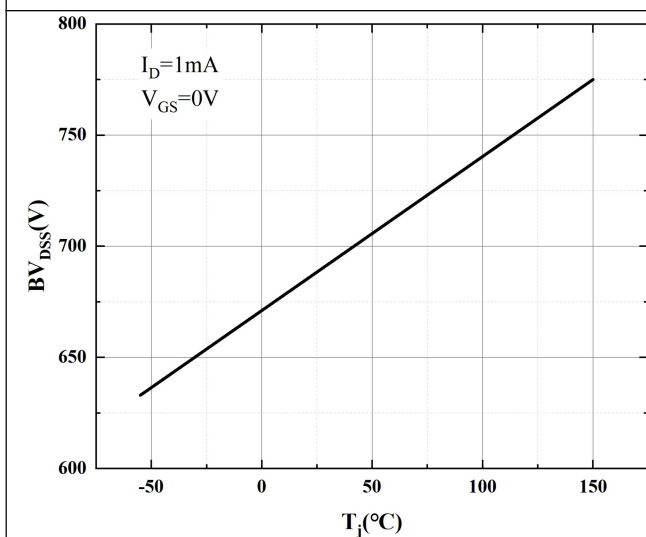


Figure 5. Drain-source Breakdown Voltage

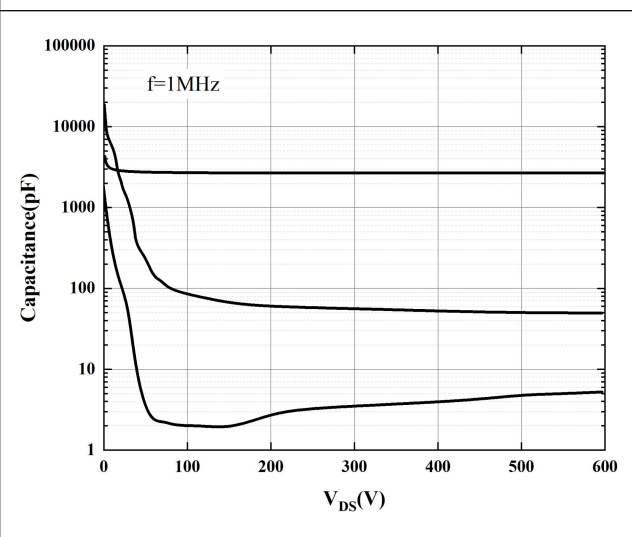


Figure 6. Capacitance Characteristics

■ Characteristic Curve

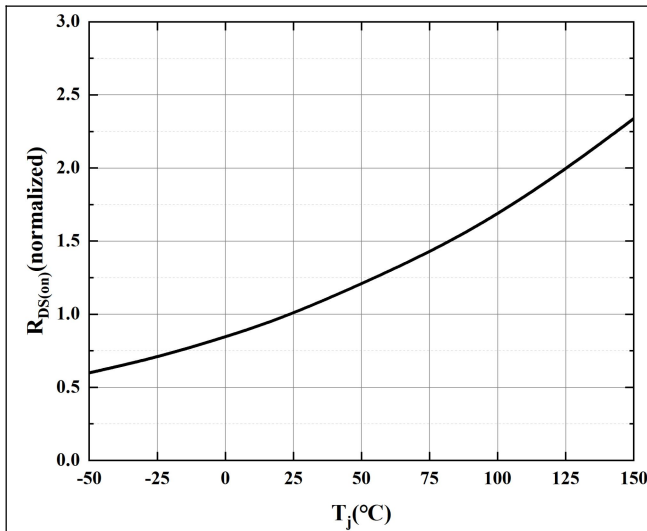


Figure 7. Typical $R_{DS(on)}$ ~Junction Temperature

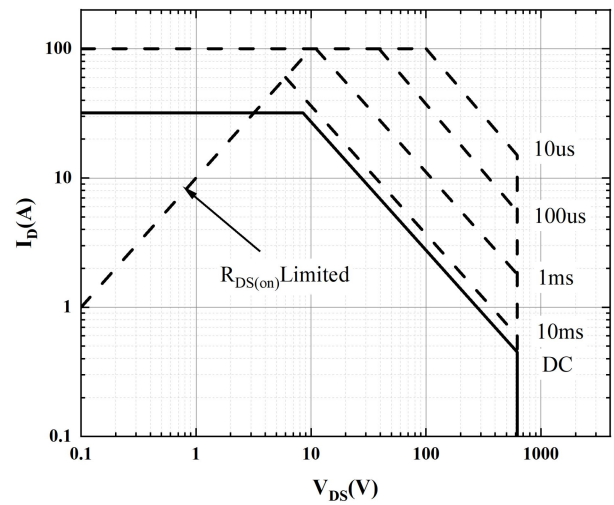


Figure 8. Typical Maximum Safe Operating Area

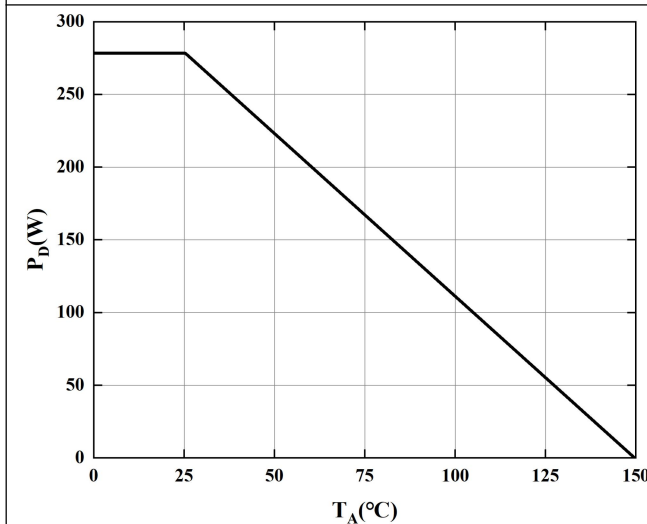


Figure 9. Typical Power Dissipation

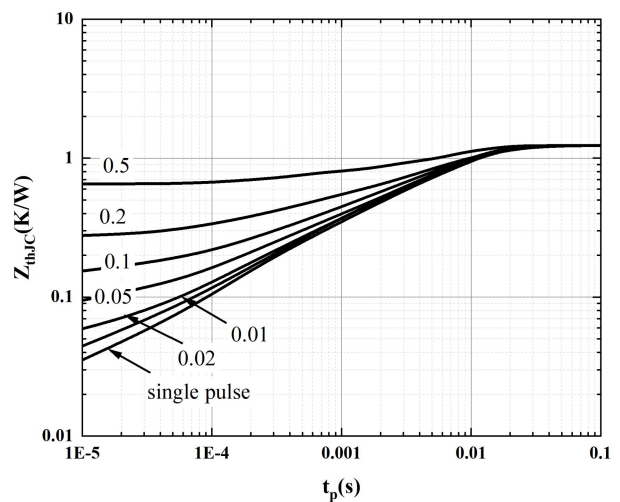


Figure 10. Max. transient thermal impedance

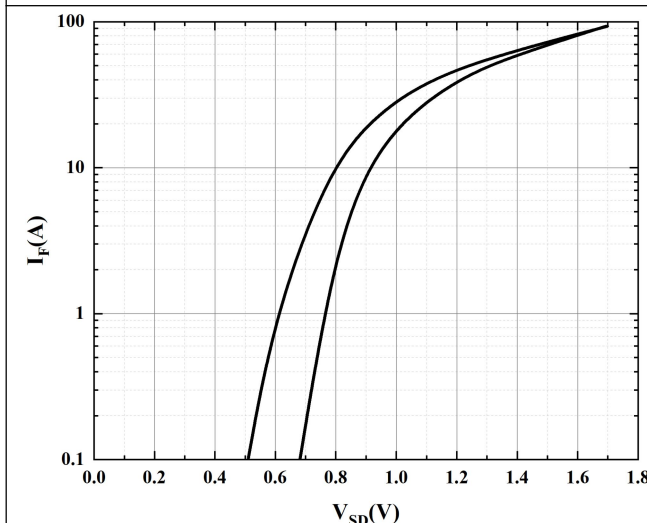


Figure 11. Forward characteristics of reverse diode

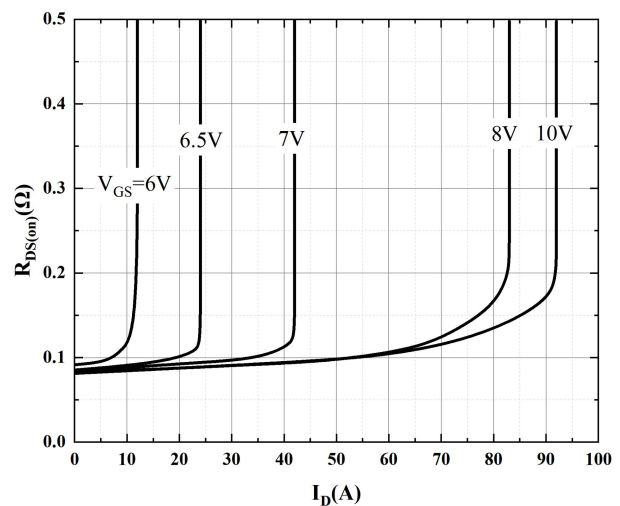
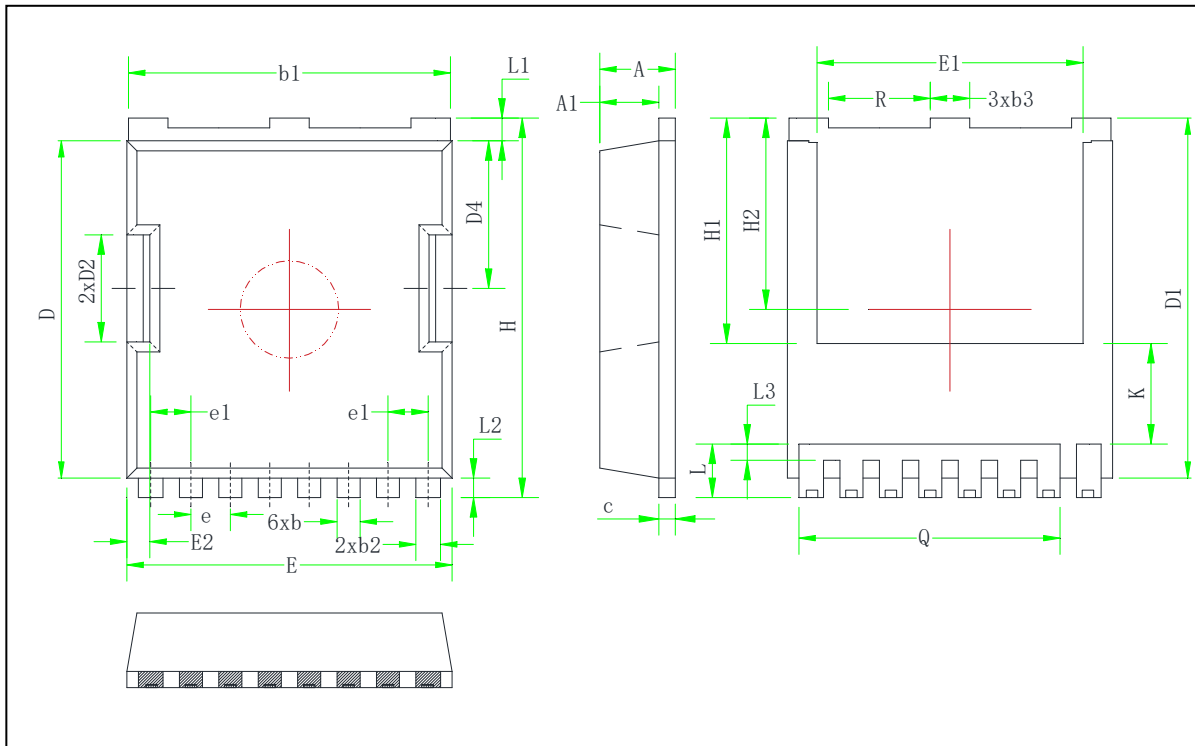


Figure 12. Typical Max. transient thermal impedance

■ Package Information

TOLL-8L



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