

Features

- Low drain-source on-resistance: $R_{DS(ON)}=150m\Omega(\text{typ})$
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Fast switching
- 100% avalanche tested
- RoHS compliant

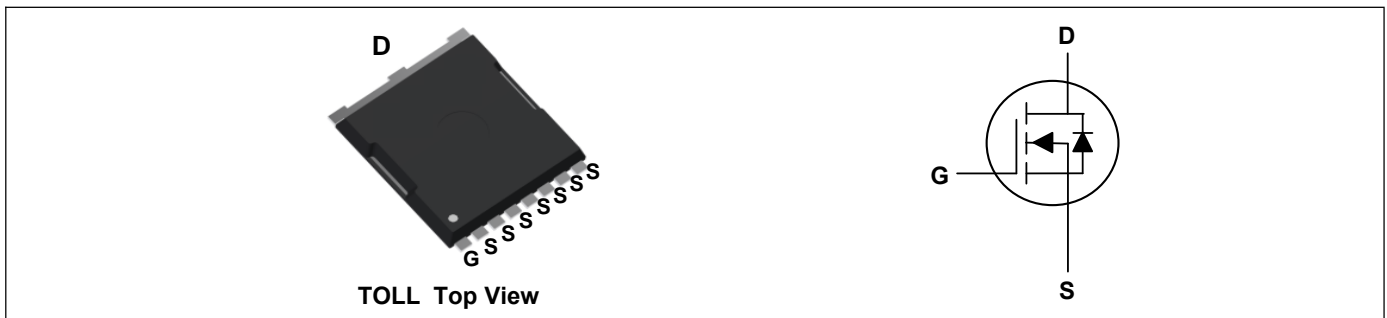
Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(ON),max}$	175	m Ω
I_D	20	A
$Q_{g,typ}$	33	nC
I_{DM}	55	A

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ¹	I_D	20	A
Pulsed Drain Current ²	I_{DM}	55	A
Single Pulse Avalanche Energy ⁴	EAS	655	mJ
Avalanche Current	I_{AS}	3.9	A
Repetitive Avalanche Energy	E_{AR}	1.6	mJ
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400\text{V}$	dv/dt	50	V/ns
Reverse diode dv/dt ³ $V_{DS}=0 \dots 400\text{V}, I_{SD} \leq I_D$		100	
Total Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	150	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.83	$^\circ\text{C/W}$

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8.5A$	---	150	175	$m\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3.0	---	5.0	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
Gate Resistance	R_G	$f = 1.0\text{MHz}$, open drain	---	1.3	---	Ω
Total Gate Charge	Q_g	$V_{DD}=400V, V_{GS}=10V, I_D=8.5A$	---	35	---	nC
Gate-Source Charge	Q_{gs}		---	8.2	---	
Gate-Drain Charge	Q_{gd}		---	17.2	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=400V, V_{GS}=10V, R_G=10\Omega, I_D=8.5A$	---	15	---	ns
Rise Time	T_r		---	9	---	
Turn-Off Delay Time	$T_{d(off)}$		---	50	---	
Fall Time	T_f		---	7	---	
Input Capacitance	C_{iss}	$V_{DS}=400V, V_{GS}=0V, f=1\text{MHz}$	---	1295	---	pF
Output Capacitance	C_{oss}		---	34	---	
Reverse Transfer Capacitance	C_{rss}		---	6	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V, I_S=8.5A, T_J=25^{\circ}\text{C}$	---	---	1.2	V
Reverse Recovery Time	t_{rr}	$I_F=8.5A$	---	119	---	nS
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	---	0.7	---	nC

Note:

- Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.50$
- Pulse width t_p limited by $T_{j,max}$
- Identical low side and high side switch with identical R_G
- $R_G=25\Omega$ Starting $T_J=25^{\circ}\text{C}$

Typical Characteristics

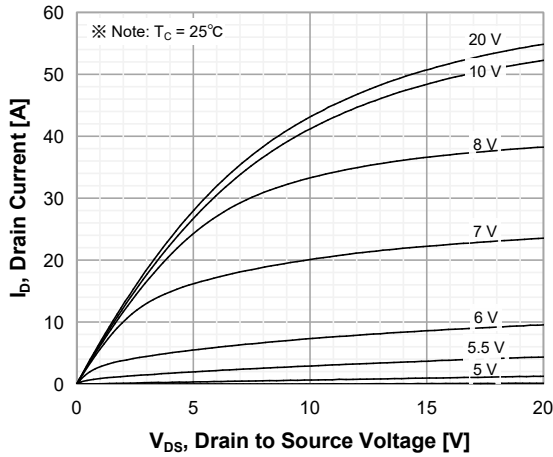


Figure 1. On-Region Characteristics

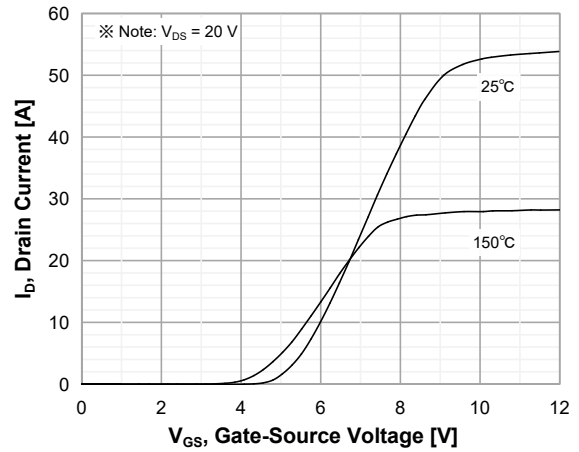


Figure 2. Transfer Characteristics

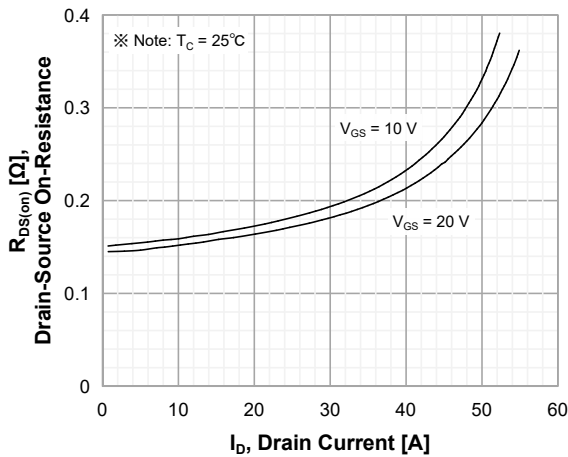


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

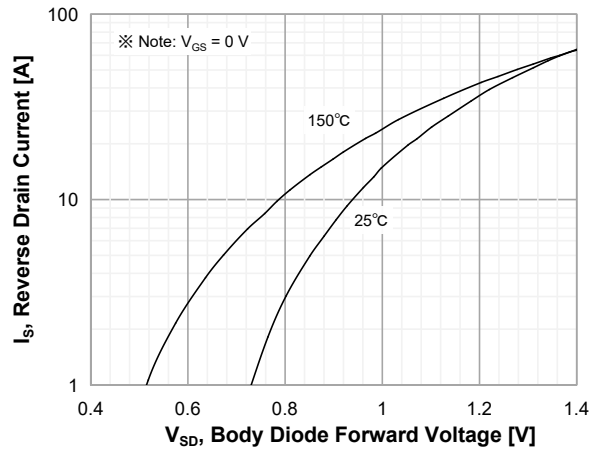


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

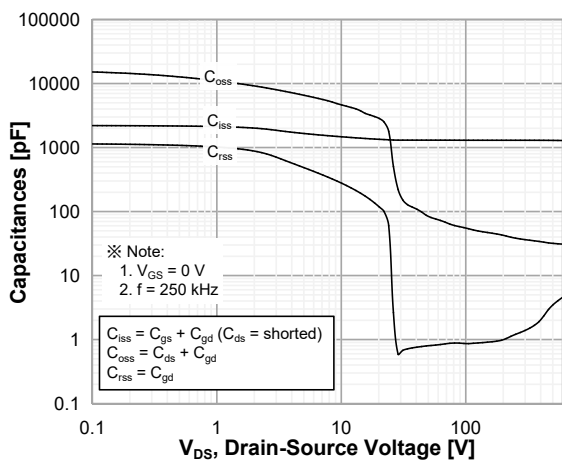


Figure 5. Capacitance Characteristics

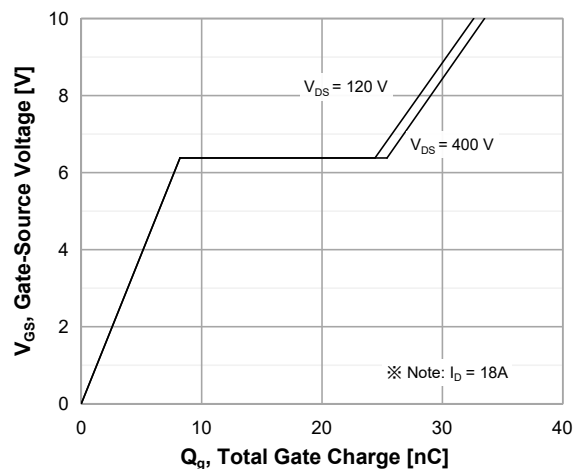


Figure 6. Gate Charge Characteristics

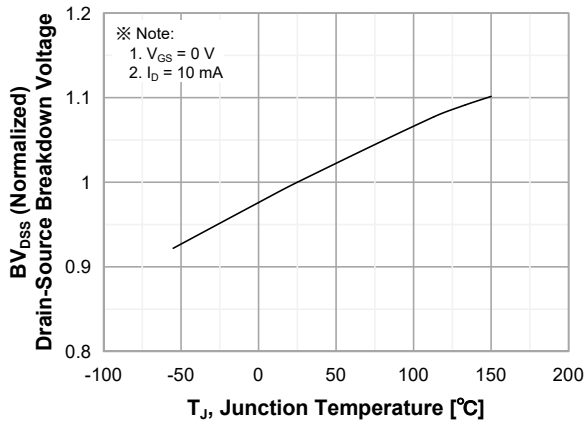


Figure 7. Breakdown Voltage Variation vs Temperature

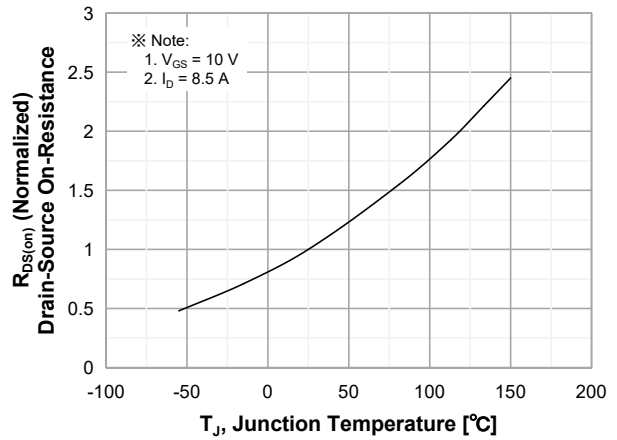


Figure 8. On-Resistance Variation vs Temperature

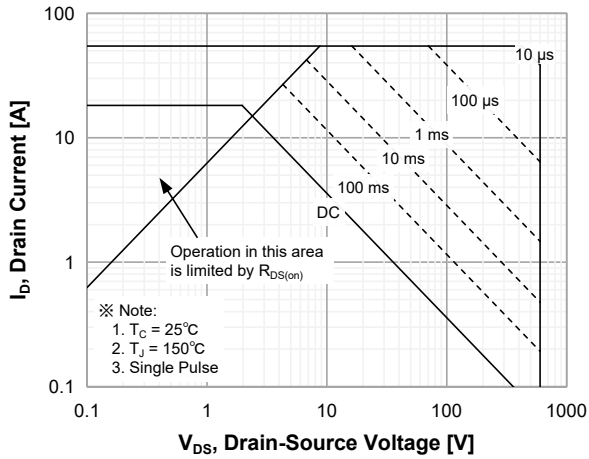


Figure 9. Maximum Safe Operating Area

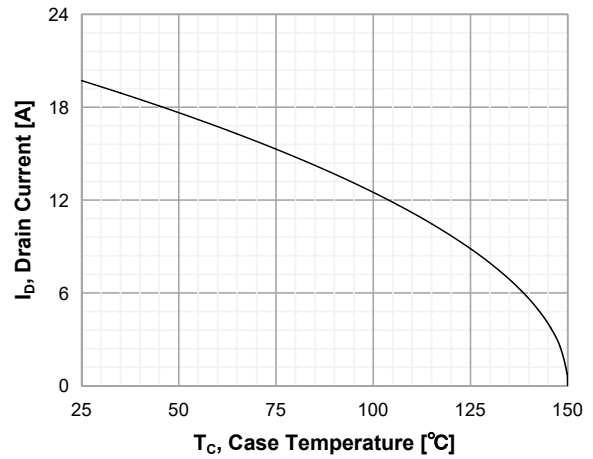


Figure 10. Maximum Drain Current vs. Case Temperature

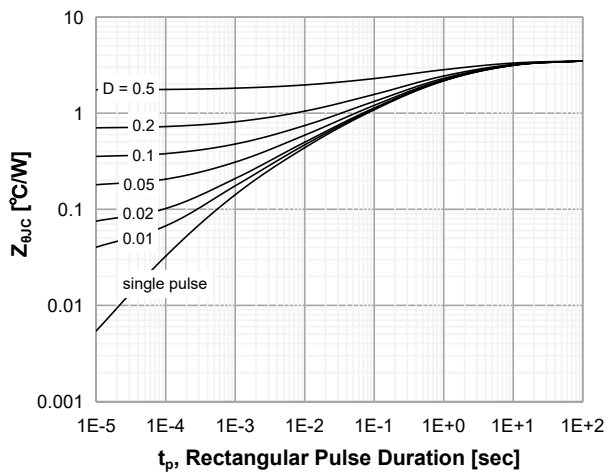
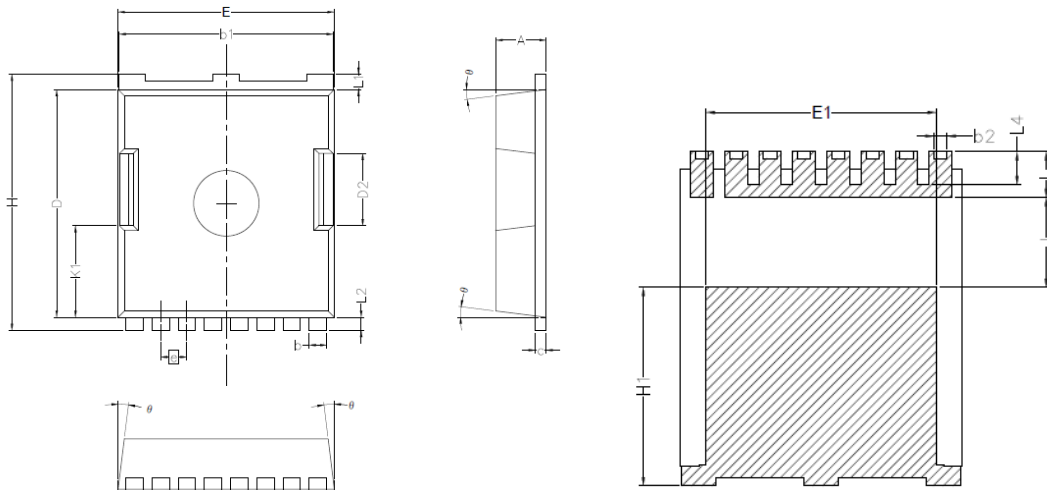


Figure 11. Transient Thermal Response Curve

TOLL-8L Package Outline Data



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.20	2.40
b	0.90	0.90
b1	9.70	9.90
b2	0.42	0.50
c	0.40	0.60
D	10.28	10.58
D2	3.10	3.50
E	9.70	10.10
E1	7.90	8.30
e	1.20BSC	
H	11.48	11.88
H1	6.75	7.15
N	8	
J	3.00	3.30
K1	3.98	4.38
L	1.40	1.80
L1	0.60	0.80
L2	0.50	0.70
L4	1.00	1.30
θ	4°	10°