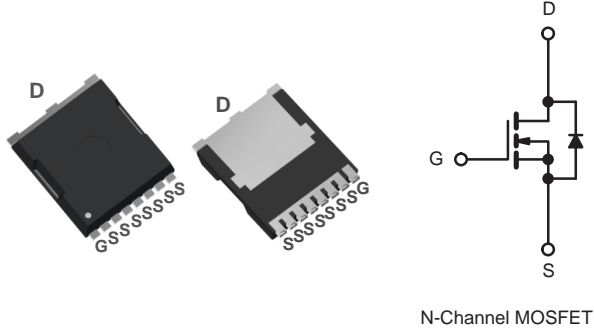


N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (mΩ) TYP.	I _D (A)	Q _g (TYP.)
40	0.58 at V _{GS} = 10 V	400	235 nC

TOLL Pin Configuration



FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS tested

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Battery management



RoHS
COMPLIANT
HALOGEN
FREE

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	400
		T _C = 100 °C	350
Pulsed Drain Current (t = 100 μs)	I _{DM}	1600	A
Avalanche Current	I _{AS}	105	mJ
Single Avalanche Energy ^a	E _{AS}	1510	
Maximum Power Dissipation ^a	P _D	T _C = 25 °C	309 ^b
		T _C = 100 °C	156 ^b
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	15	°C/W
Junction-to-Case (Drain)	R _{thJC}	0.5	

Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

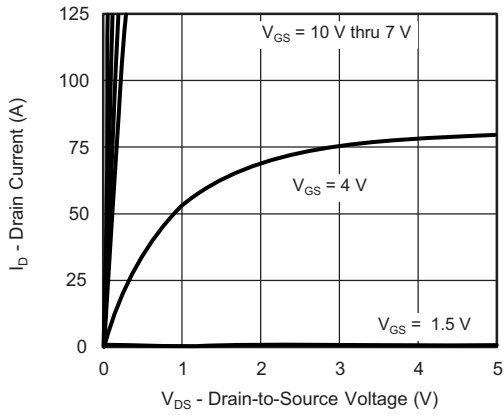
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.3	-	2.3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	-	-	10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	400	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	0.58	0.75	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	-	0.72	1.0	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 20\text{ A}$	-	98	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$	-	19670	-	pF
Output Capacitance	C_{oss}		-	3880	-	
Reverse Transfer Capacitance	C_{rss}		-	255	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	235	-	nC
Gate-Source Charge ^c	Q_{gs}		-	58	-	
Gate-Drain Charge ^c	Q_{gd}		-	22	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	2.8	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}, I_D = 20\text{ A}, R_g = 3\text{ }\Omega$ $V_{GEN} = 10\text{ V}$	-	28	-	ns
Rise Time ^c	t_r		-	15	-	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	182	-	
Fall Time ^c	t_f		-	32	-	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	400	A
Pulsed Current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	1600	A
Forward Voltage ^a	V_{SD}	$I_F = 1\text{ A}, V_{GS} = 0\text{ V}$	-	-	1	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 500\text{ A}/\mu\text{s}$	-	38	-	ns
Reverse Recovery Charge	Q_{rr}		-	155	-	nC

Notes

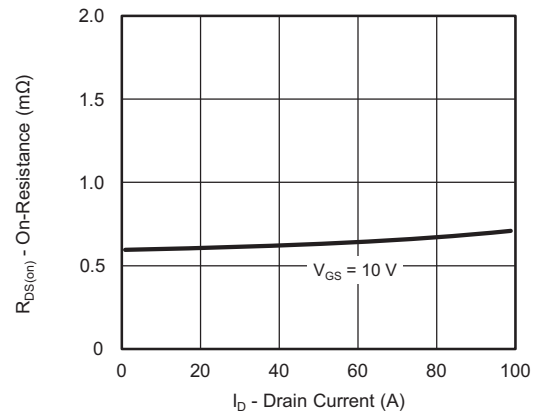
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

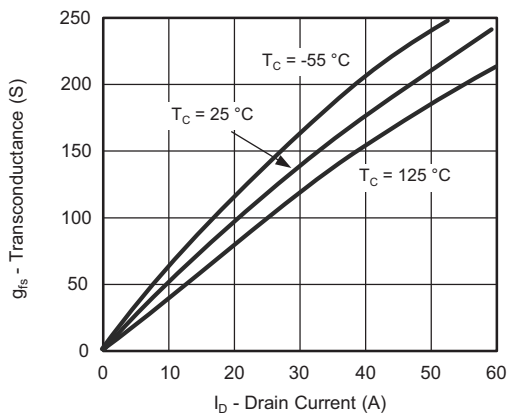
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



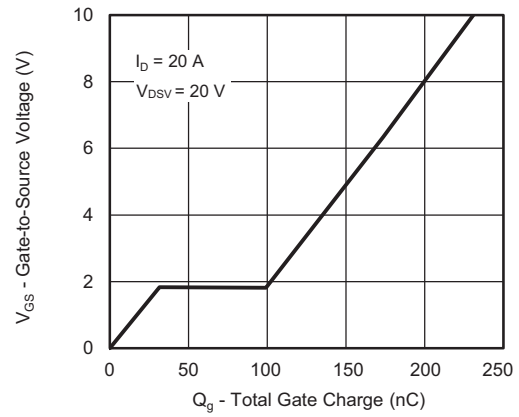
Output Characteristics



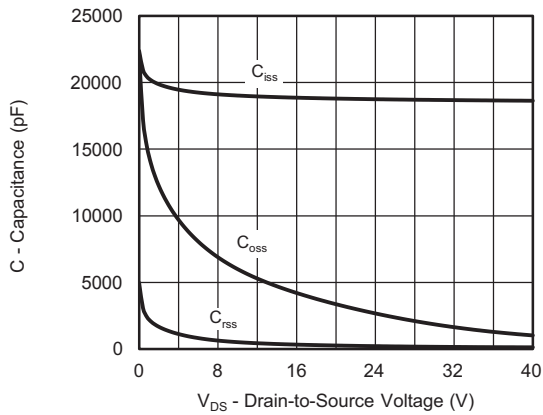
On-Resistance vs. Drain Current



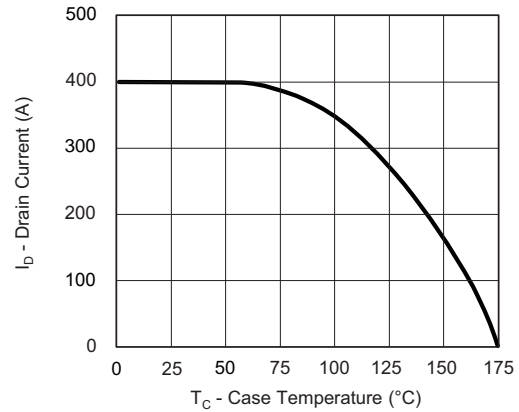
Transconductance



Gate Charge

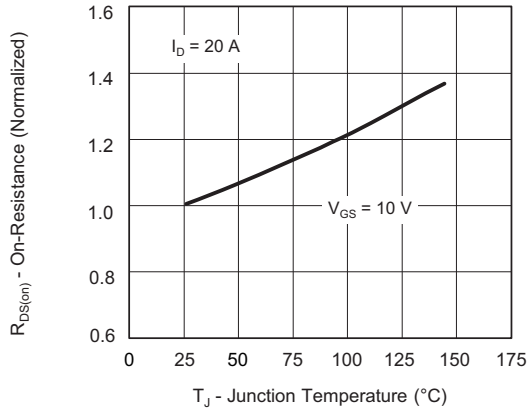


Capacitance

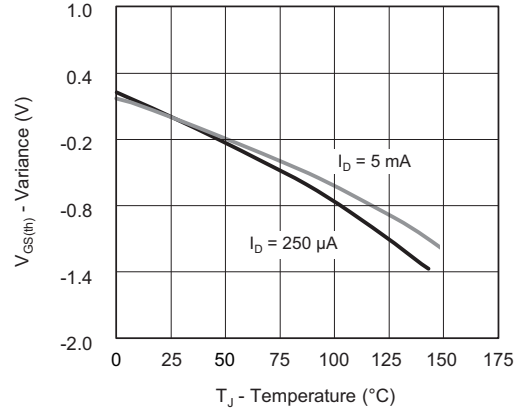


Current De-Rating

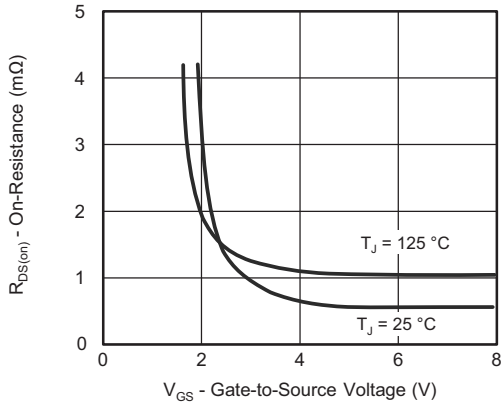
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



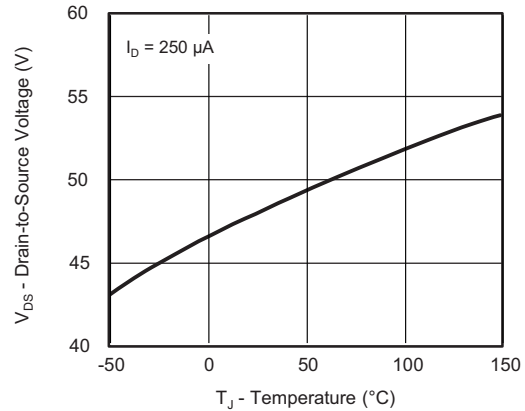
On-Resistance vs. Junction Temperature



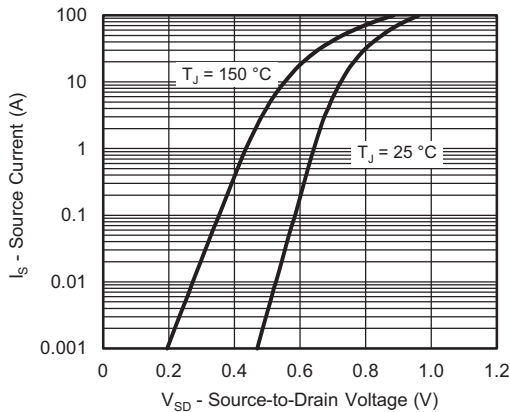
Threshold Voltage



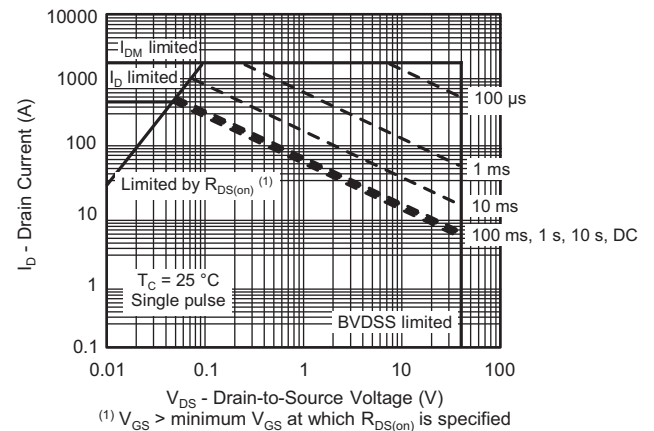
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



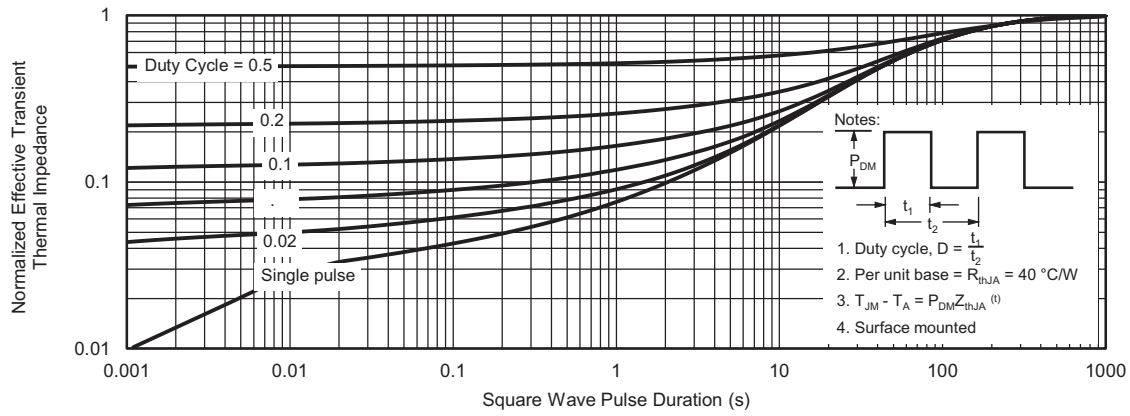
Source Drain Diode Forward Voltage



Safe Operating Area

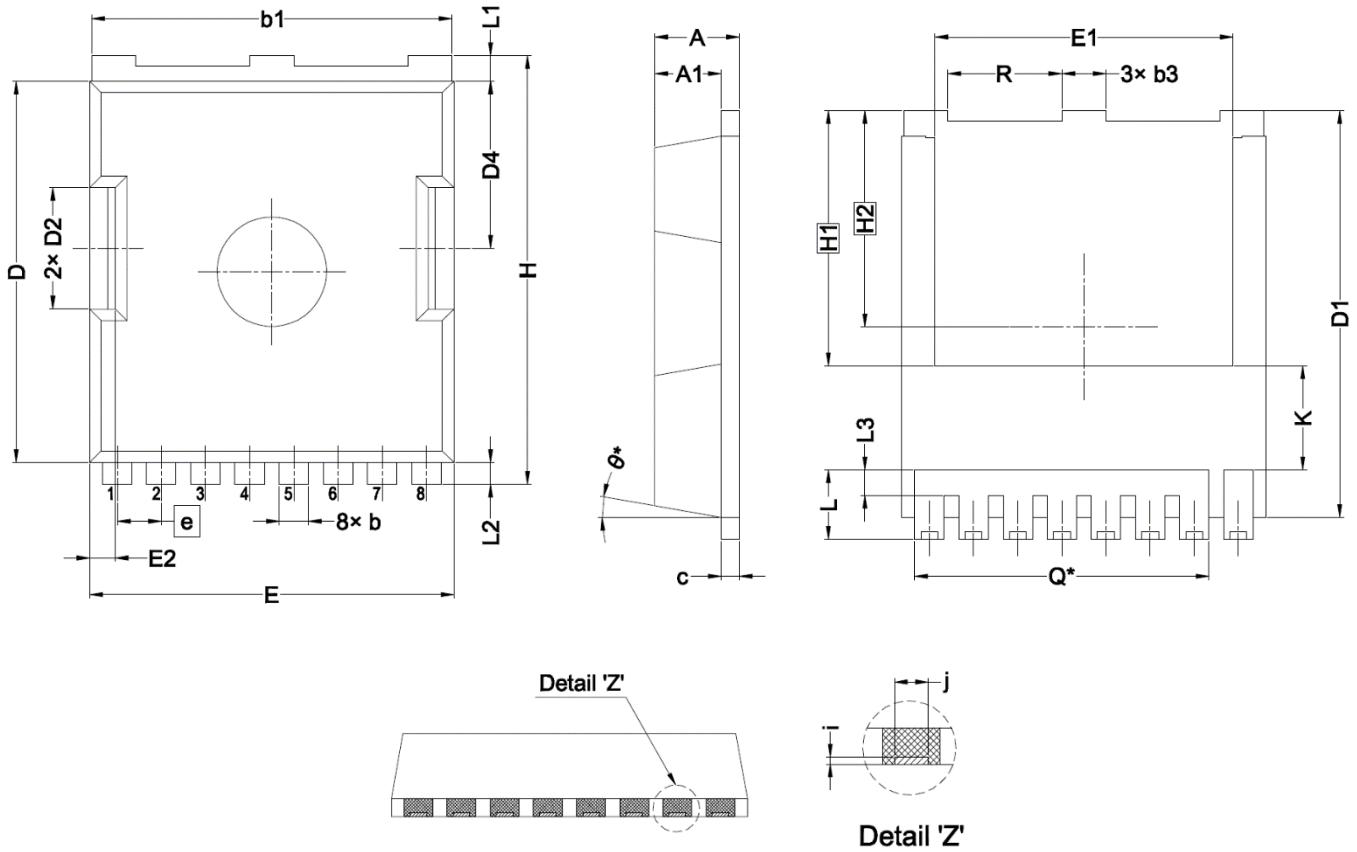
(1) $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



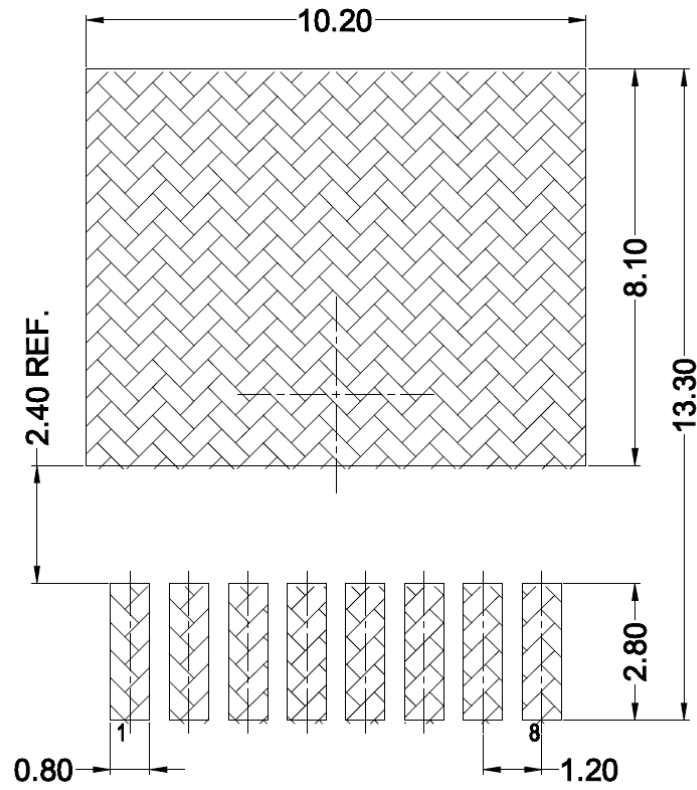
Normalized Thermal Transient Impedance, Junction-to-Ambient

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

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