

## N-Channel 150 V (D-S) MOSFET



**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ) MAX.	I <sub>D</sub> (A)	Q <sub>g</sub> (TYP.)
150	4.6 at V <sub>GS</sub> = 10 V	180	80 nC

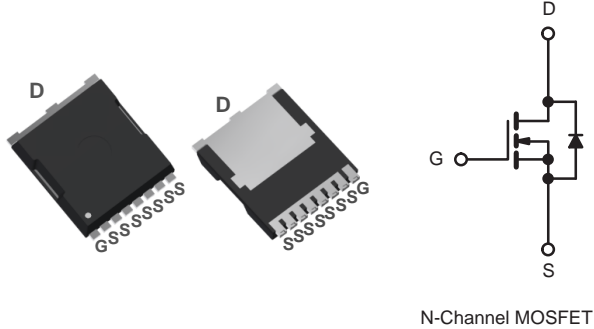
### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS tested
- High Speed Power Switching

### APPLICATIONS

- Power tools
- Synchronous rectification
- Hard Switching and High Speed Circuit
- DC/DCin Telecoms and Industrial

### TOLL Pin Configuration



### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V <sub>DS</sub>	150	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	180
		T <sub>C</sub> = 100 °C	129
Pulsed Drain Current (t = 100 μs)	I <sub>DM</sub>	580	A
Avalanche Current	I <sub>AS</sub>	156	mJ
Single Avalanche Energy <sup>a</sup>	E <sub>AS</sub>	750	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	357 <sup>b</sup>
		T <sub>C</sub> = 100 °C	178 <sup>b</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C

### THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) <sup>c</sup>	R <sub>thJA</sub>	60	°C/W
Junction-to-Case (Drain)	R <sub>thJC</sub>	0.42	

#### Notes

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

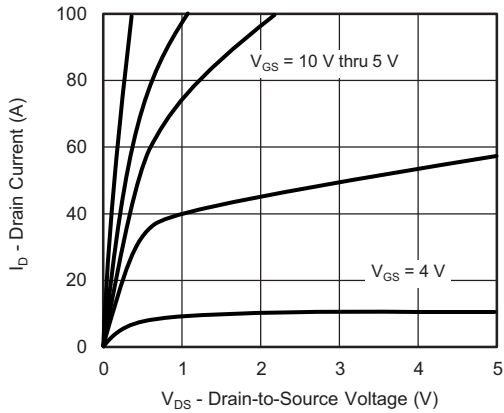
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	-	4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 150\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 150\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$	-	-	100	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	180	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	4.6	5.5	m $\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}$	-	80	-	S
<b>Dynamic <sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 75\text{ V}, f = 1\text{ MHz}$	-	6365	-	pF
Output Capacitance	$C_{oss}$		-	403	-	
Reverse Transfer Capacitance	$C_{rss}$		-	10	-	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	83	-	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$		-	25	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$		-	11	-	
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	2.5	-	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 75\text{ V}, I_D = 20\text{ A}, R_g = 6\Omega$ $V_{GEN} = 10\text{ V}$	-	31	-	ns
Rise Time <sup>c</sup>	$t_r$		-	20	-	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$		-	39	-	
Fall Time <sup>c</sup>	$t_f$		-	15	-	
<b>Drain-Source Body Diode Ratings and Characteristics <sup>b</sup></b> ( $T_C = 25\text{ }^\circ\text{C}$ )						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	-	-	180	A
Pulsed Current ( $t = 100\text{ }\mu\text{s}$ )	$I_{SM}$		-	-	580	A
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	86	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	169	-	nC

**Notes**

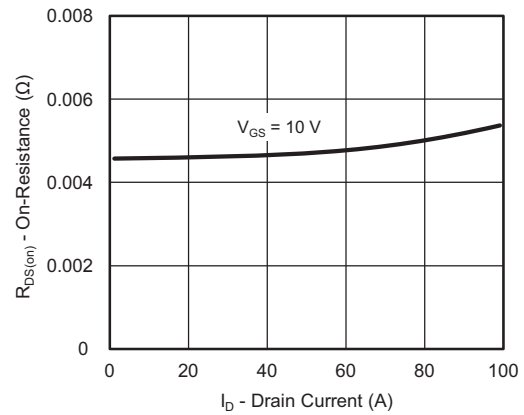
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

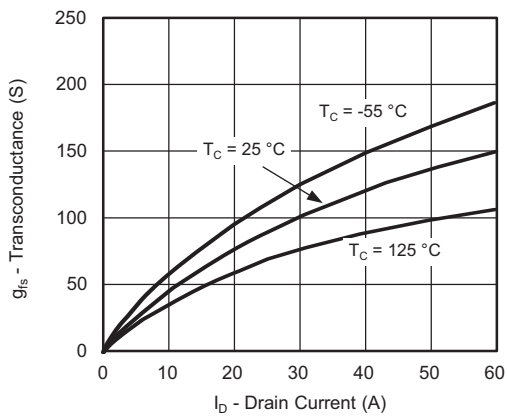
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



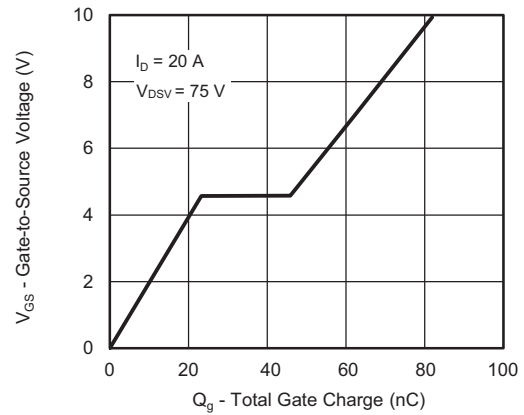
**Output Characteristics**



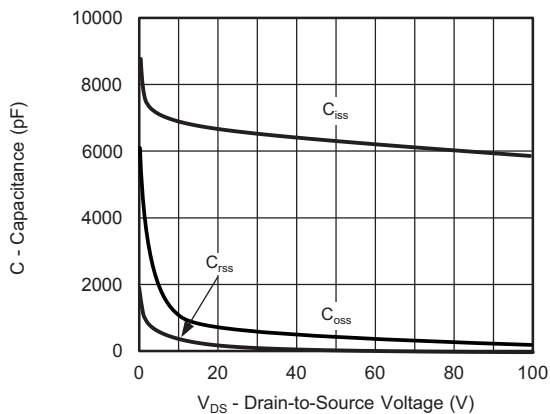
**On-Resistance vs. Drain Current**



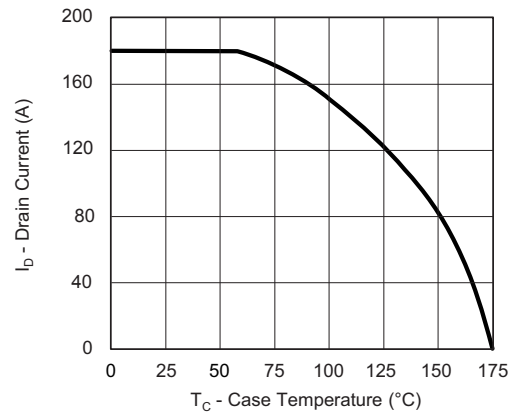
**Transconductance**



**Gate Charge**

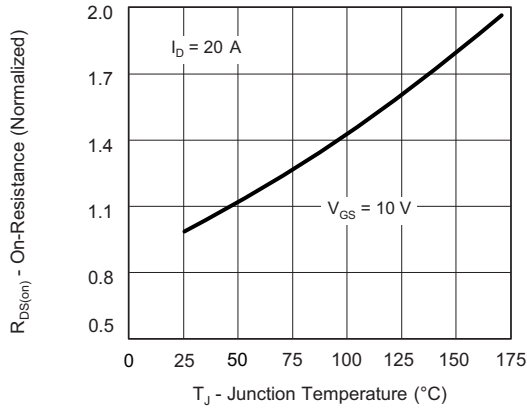


**Capacitance**

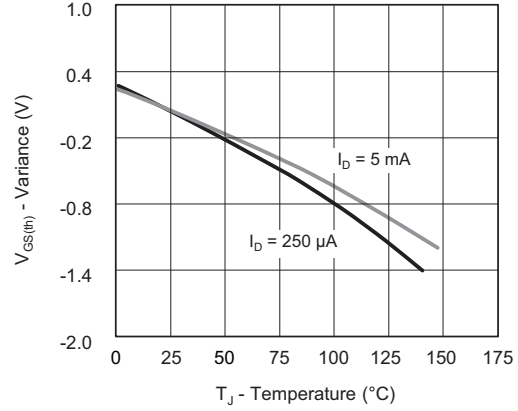


**Current De-Rating**

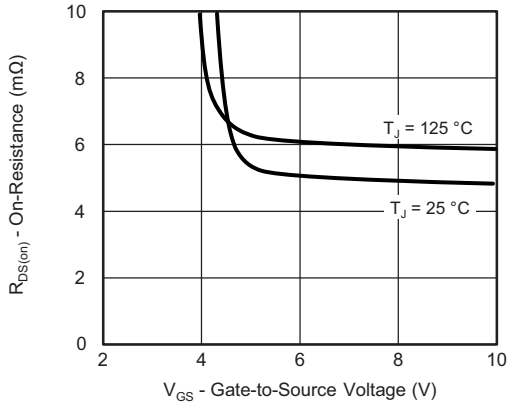
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



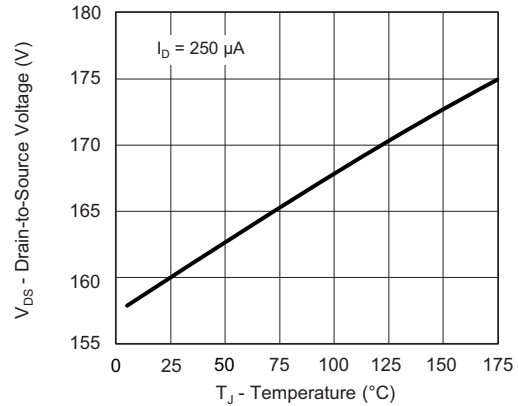
**On-Resistance vs. Junction Temperature**



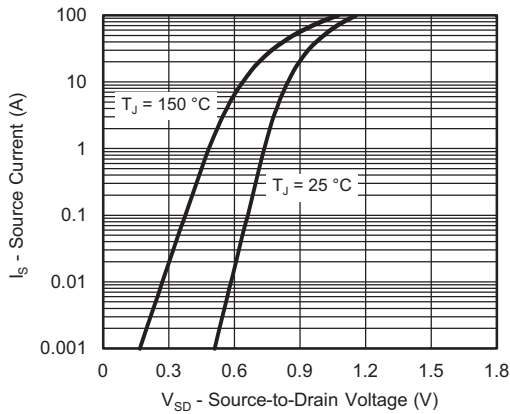
**Threshold Voltage**



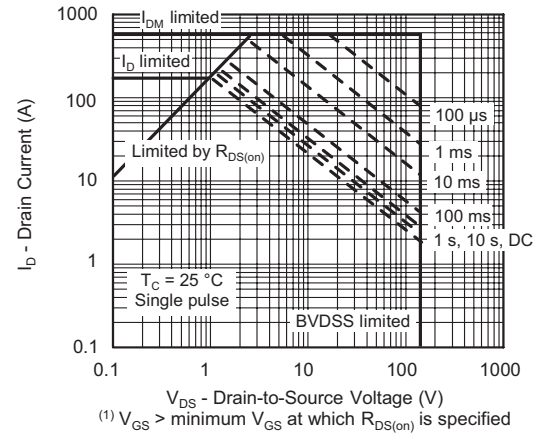
**On-Resistance vs. Gate-to-Source Voltage**



**Drain Source Breakdown vs. Junction Temperature**



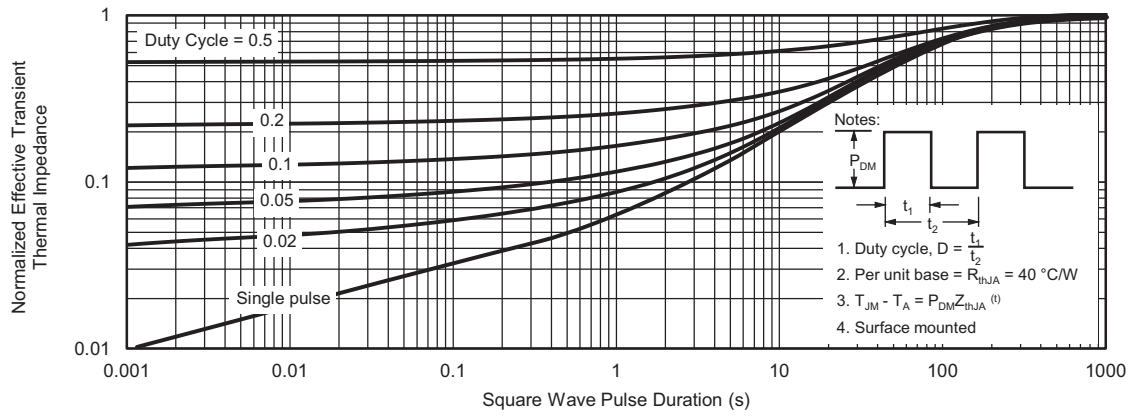
**Source Drain Diode Forward Voltage**



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

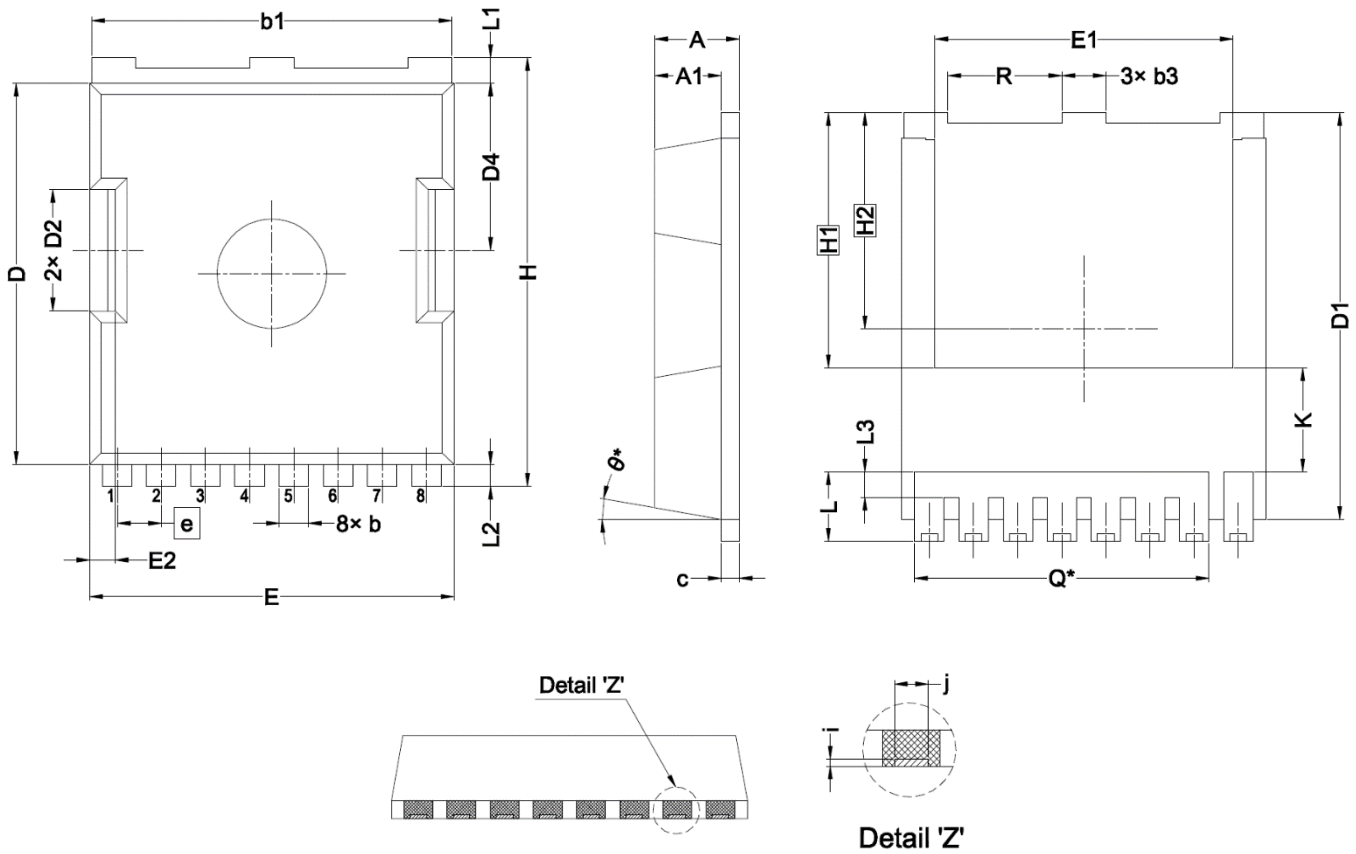
**Safe Operating Area**

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



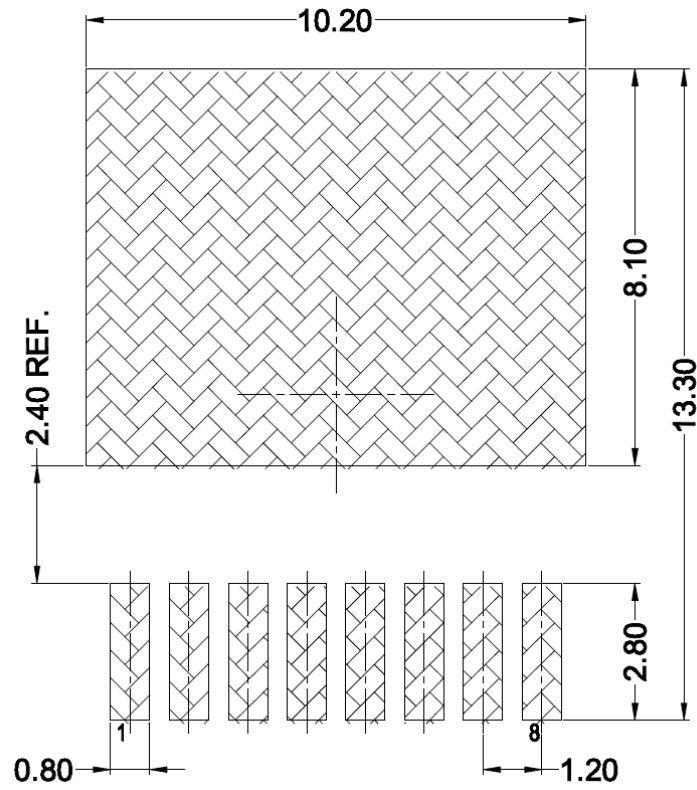
**Normalized Thermal Transient Impedance, Junction-to-Ambient**

## 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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