

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ✓ Surface-mounted package
- ✓ Advanced trench cell design
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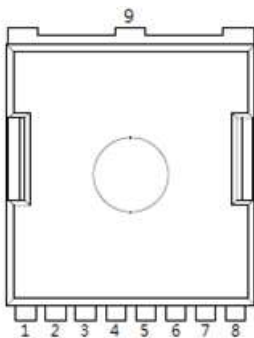
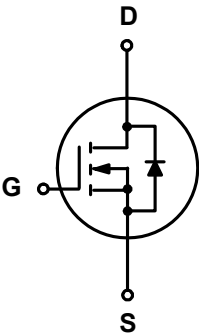
1.2 Applications

- ✓ Portable appliances
- ✓ High speed switch
- ✓ Battery management
- ✓ Low power DC to DC Converter

1.3 Quick reference

- ✓ $BV \geq 40\text{ V}$
- ✓ $P_{tot} \leq 600\text{ W}$
- ✓ $I_D \leq 400\text{ A}$
- ✓ $R_{DS(ON)} \leq 0.85\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ✓ $R_{DS(ON)} \leq 1.65\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 Top View TOLL	
2,3,4,5,6,7,8	Source(S)		
9	Drain(D)		

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	40	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
$I_{D}^{*,***}$	Drain Current	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	400	A
$I_{D}^{*,***}$	Drain Current	$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	160	A
$I_{DM}^{*,**}$	Pulsed Drain Current	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	1600	A
P_{tot}^{*}	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	600	W
T_{stg}	Storage Temperature		- 55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		- 55	150	$^{\circ}\text{C}$
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	400	A
E_{AS}^{*}	Single Pulsed Avalanche Energy	$V_{DD} = 30\text{ V}, L = 1.0\text{ mH}$	-	968	mJ
$R_{\theta JA}^{*}$	Thermal Resistance- Junction to Ambient		-	42	$^{\circ}\text{C} / \text{W}$
$R_{\theta JC}^{*}$	Thermal Resistance- Junction to Case		-	0.25	

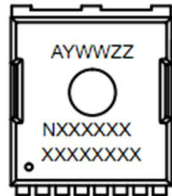
Notes :

* Surface Mounted on 1 in² pad area, $t \leq 10\text{ sec}$

** Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 1\%$

*** limited by bonding wire

4. Marking Information

Product Name	Marking
UP008N04TH	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP008N04TH	TOLL-8L			2000	

6. Electrical Characteristics

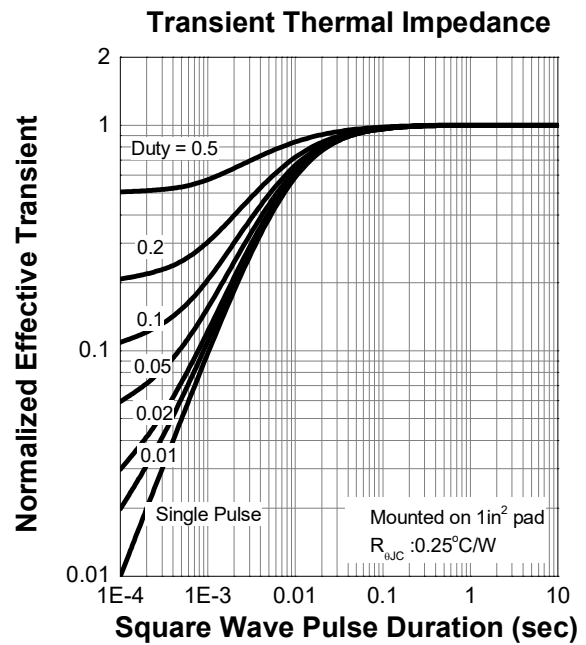
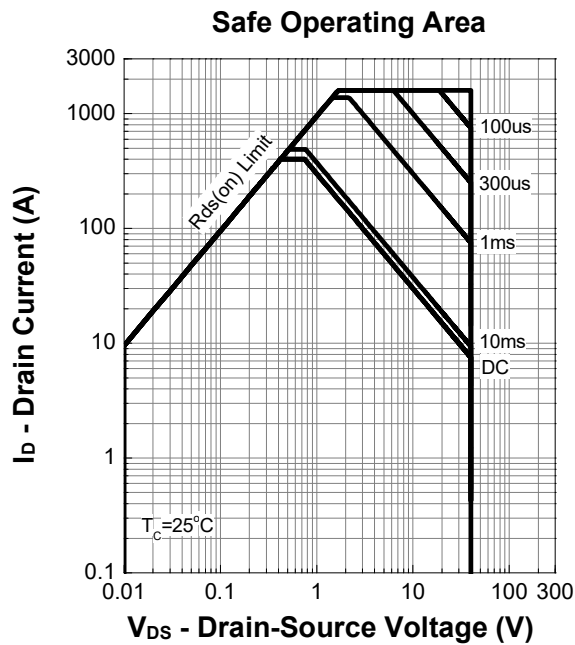
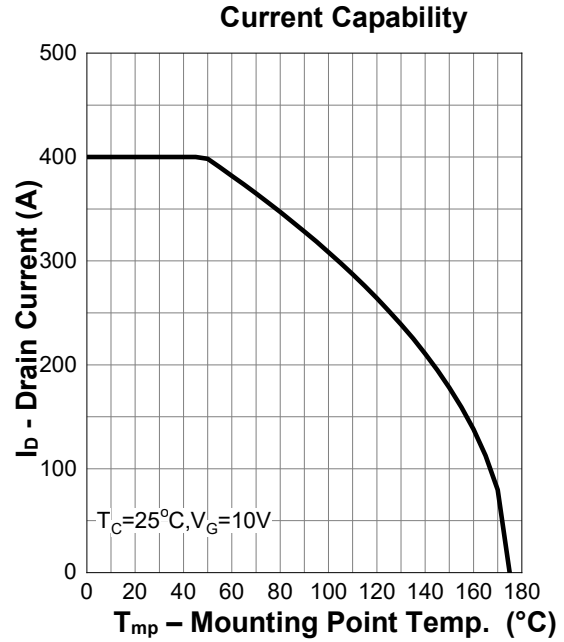
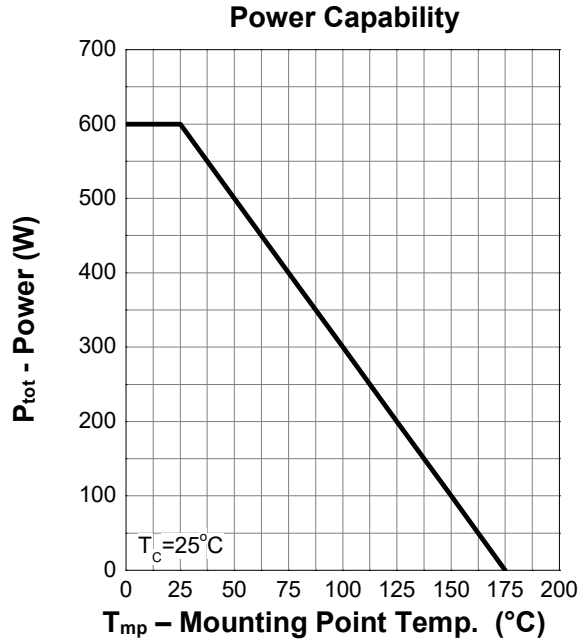
($T^A = 25\text{ }^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	2	-	4	V
I _{DSS}	Drain Leakage Current	V _{DS} = 32 V, V _{GS} = 0 V	-	-	1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 20 V, V _{DS} = 0 V	-	-	± 100	nA
R _{DS(ON)} ^a	On-State Resistance	V _{GS} = 10 V, I _{DS} = 50 A	-	0.75	0.85	mΩ
		V _{GS} = 6 V, I _{DS} = 20 A	-	1.45	1.65	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 50 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = 50 A, dI _{SD} / dt = 100 A / μs	-	55	-	nS
Q _{rr}	Reverse Recovery Charge		-	59	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V Frequency = 1 MHz	-	7248	-	pF
C _{oss}	Output Capacitance		-	2978	-	
C _{rss}	Reverse Transfer Capacitance		-	136	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 20I _L , V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 0.4 Ω, I _{DS} = 50 A	-	26	-	nS
t _r	Turn-on Rise Time		-	119	-	
t _{d(off)}	Turn-off Delay Time		-	87	-	
t _f	Turn-off Fall Time		-	87	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 20 V, I _{DS} = 50 A	-	122	-	nC
Q _{gs}	Gate-Source Charge		-	39	-	
Q _{gd}	Gate-Drain Charge		-	30	-	

Notes : a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 1\%$

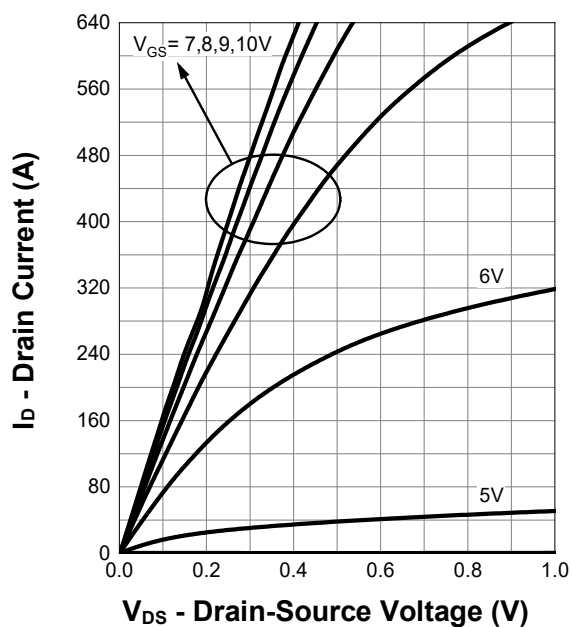
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

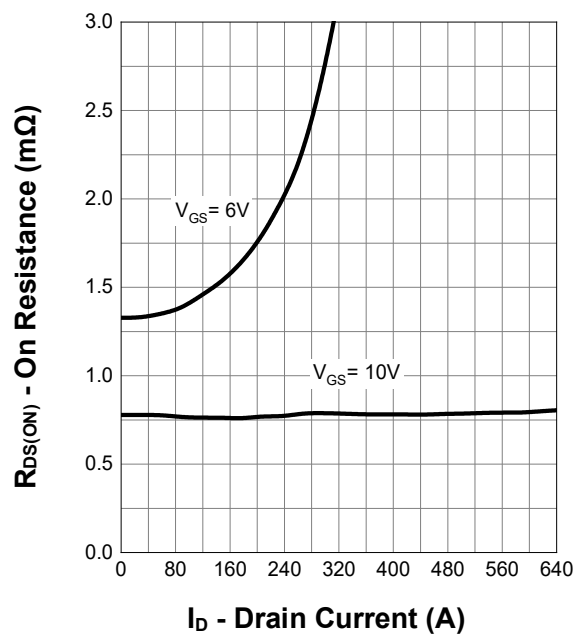


7. Typical Characteristics (cont.)

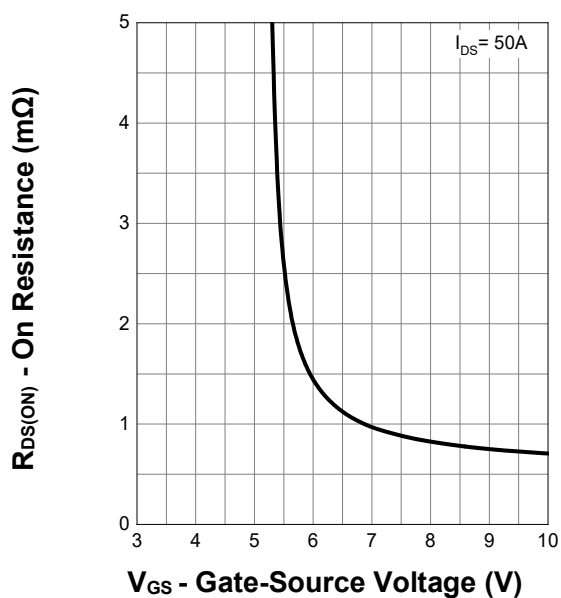
Output Characteristics



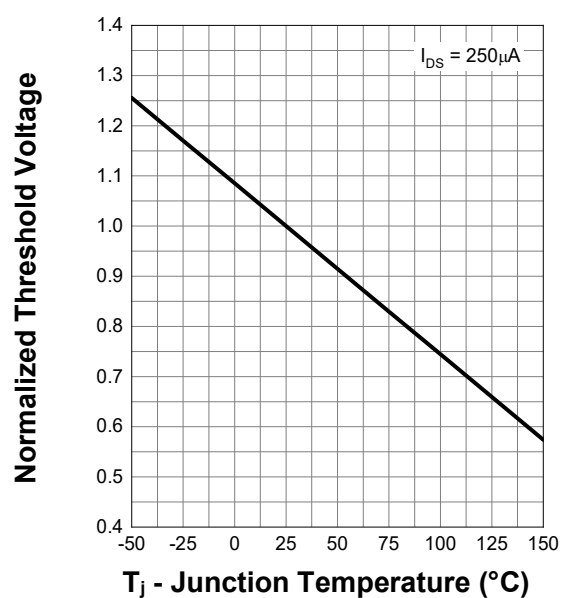
On Resistance



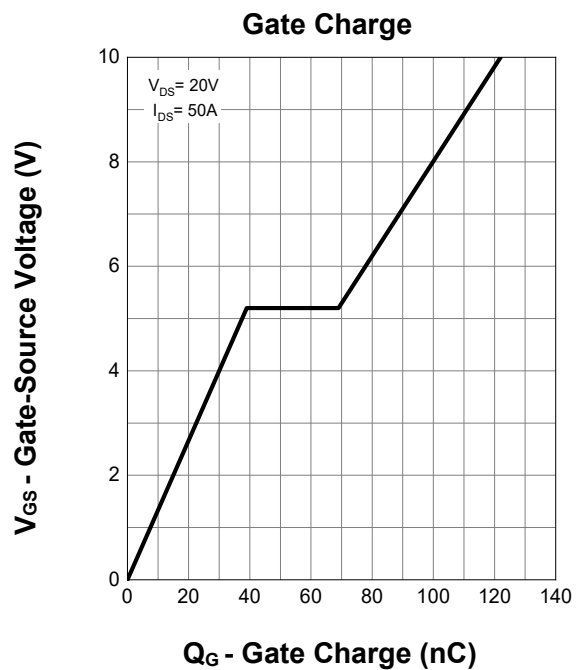
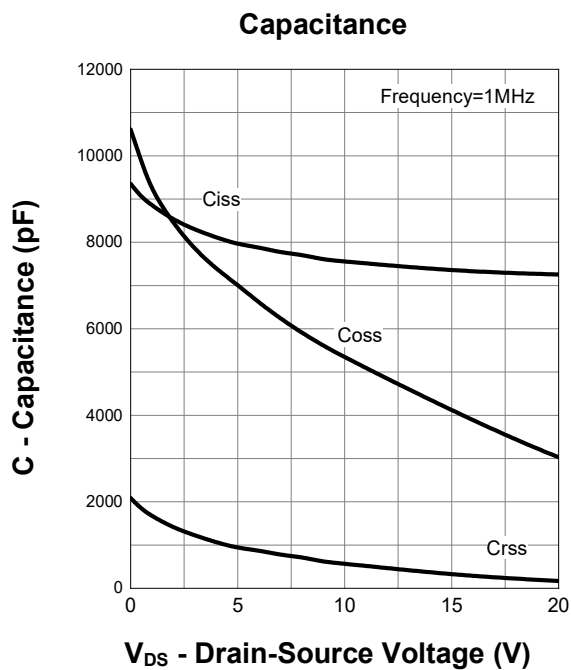
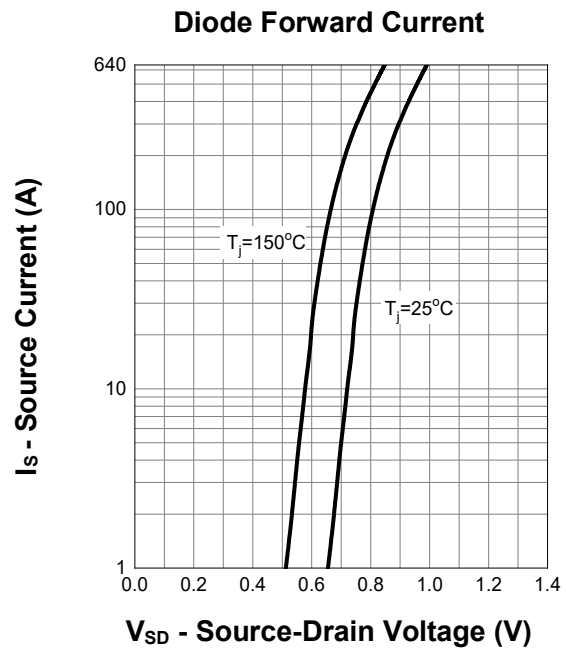
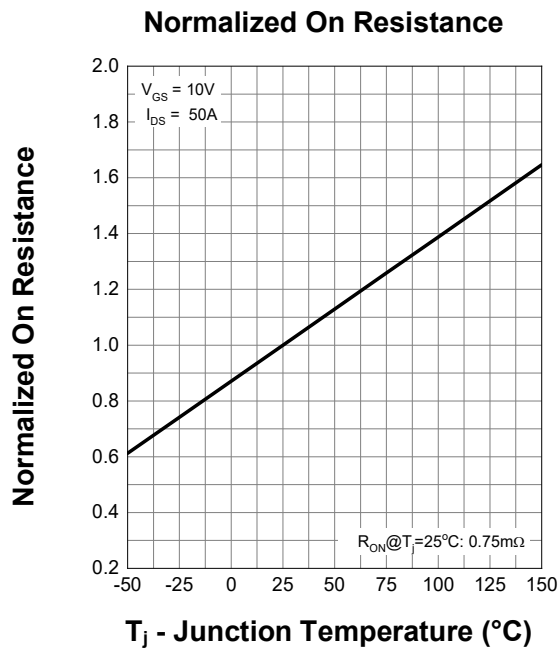
Transfer Characteristics



Normalized Threshold Voltage

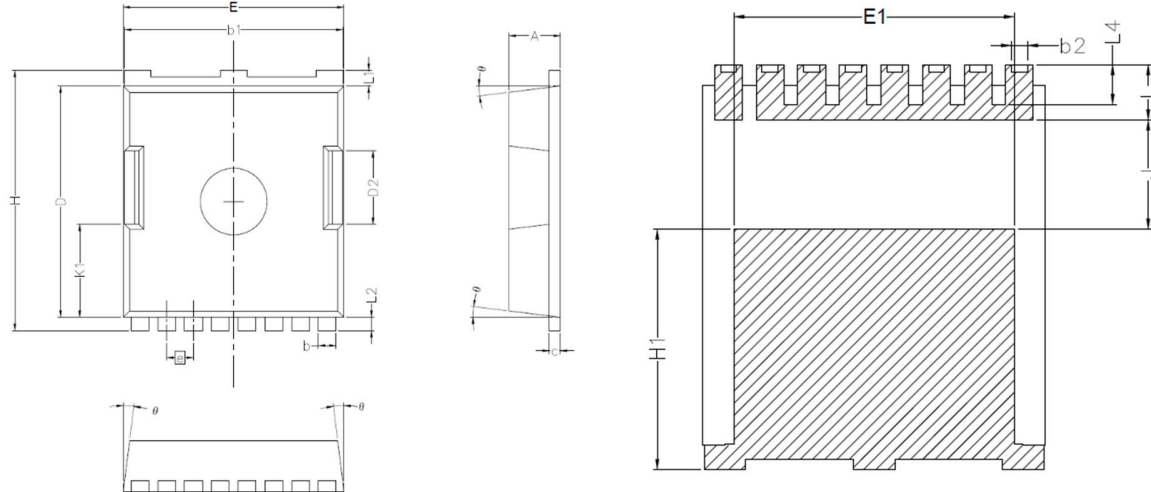


7. Typical Characteristics (cont.)



8. Package Dimensions

TOLL-8L Package



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.20	2.40
b	0.70	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°