N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☑ Surface-mounted package
- ☑ Advanced trench cell design

1.2 Applications

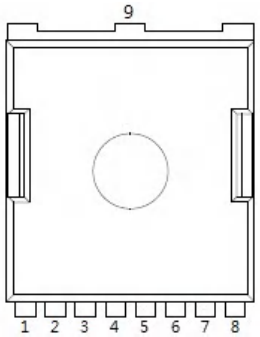
- ☑ LCD TV appliances
- ☑ LCDM appliances
- ☑ High power inverter system

1.3 Quick reference

- ☑ BV ≧ 40 V
- ☑ P_{tot} ≦ 300 W
- ☑ I_D ≦ 370A
- ☑ $R_{DS(ON)}$ ≦ 0.95 mΩ @ V_{GS} = 10 V
- ☑ $R_{DS(ON)}$ ≦ 1.45 mΩ @ V_{GS} = 4.5 V

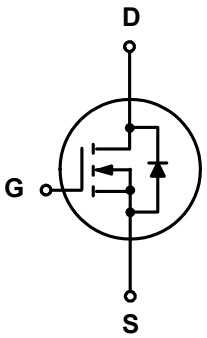
2. Pin Description

Pin	Description
1	Gate(G)
2,3,4,5,6,7,8	Source(S)
9	Drain(D)



Top View

TOLL



3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	40	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	±20	V
I_D*	Drain Current (DC)	T_C = 25 ℃, V_{GS} = 10 V	-	370	A
		T_C = 100 ℃, V_{GS} = 10 V	-	261	A
I_{DM}*	Drain Current (Pulsed)	T_C = 25 ℃, V_{GS} = 10 V	-	1480	A
P_{tot}	Drain power dissipation	T_C = 25 ℃	-	300	W
T_{stg}	Storage Temperature		-55	175	℃
T_J	Junction Temperature		-	175	℃
I_S	Continuous-Source Current	T_C = 25 ℃	-	370	A
I_{AS}	Single Pulsed Avalanche Current	V_{DD}=40V , L=0.1mH	-	140	A
E_{AS}	Single Pulsed Avalanche Energy	V_{DD}=40V , L=1.0mH	-	1800	mJ
$R_{\theta JA}$**	Thermal Resistance- Junction to Ambient		-	42	℃/W
$R_{\theta JC}$**	Thermal Resistance- Junction to Case		-	0.5	

Notes：

* Pulse width ≤ 300 μs, duty cycle ≤ 2 %

** Surface Mounted on 1 in^2 pad area, t ≤ 10 sec

*** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP010N04CT	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP010N04CT	**TOLL-8L**			**2000**	

6. Electrical Characteristics (T_A = 25 °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	1	-	2	V
I_{DSS}	Drain Leakage Current	V_{DS} = 32 V, V_{GS} = 0 V	-	-	1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = 0 V, V_{GS} = ± 20 V	-	-	±100	nA
$R_{DS(ON)}$[a]	On-State Resistance	V_{GS} = 10 V, I_{DS} = 50 A	-	0.85	0.95	mΩ
		V_{GS} = 4.5 V, I_{DS} = 30 A	-	1.2	1.45	
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_{DS} = 50 A, V_{GS} = 0 V dI_{SD}/dt = 100 A/μs	-	22	-	nS
Q_{rr}	Reverse Recovery Charge		-	13	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 20 V Frequency = 1 MHz	-	13566	-	pF
C_{oss}	Output Capacitance		-	1037	-	
C_{rss}	Reverse Transfer Capacitance		-	420	-	
t_d(on)	Turn-on Delay Time	V_{DS} = 20 V, V_{GEN} = 10 V, R_G = 3.9 Ω, R_L = 0.4 Ω, I_{DS} = 50 A	-	19	-	nS
t_r	Turn-on Rise Time		-	258	-	
t_d(off)	Turn-off Delay Time		-	171	-	
t_f	Turn-off Fall Time		-	138	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{DS} = 20 V, V_{GS} = 10 V, I_{DS} = 50 A	-	243	-	nC
Q_{gs}	Gate-Source Charge		-	47	-	
Q_{gd}	Gate-Drain Charge		-	37	-	

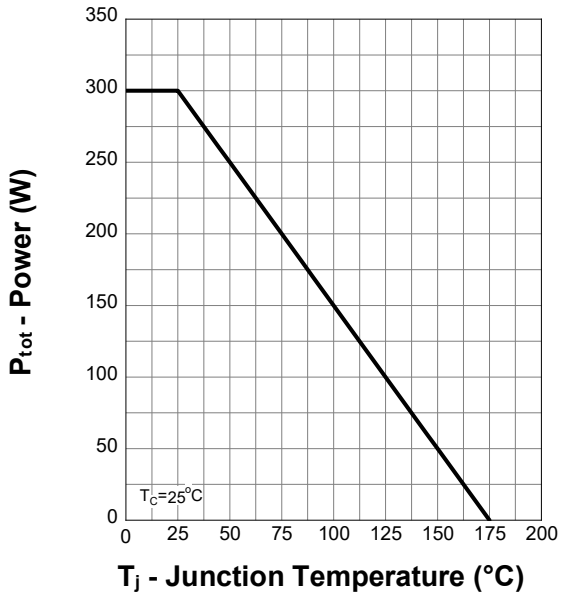
Notes：

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

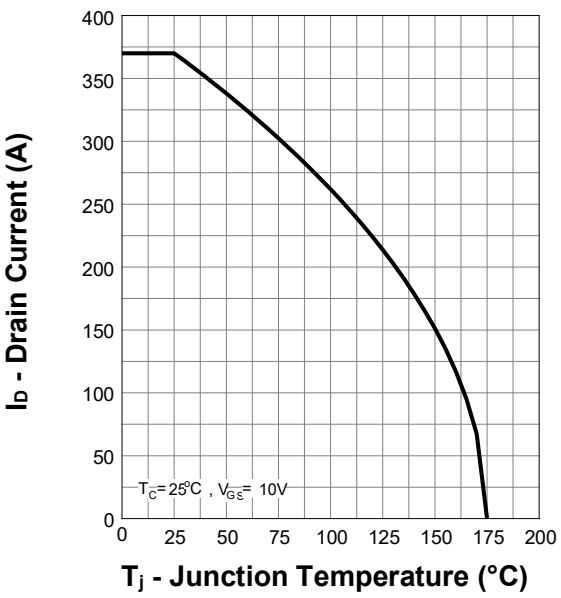
b : Guaranteed by design, not subject to production testing

7. Typical Characteristics

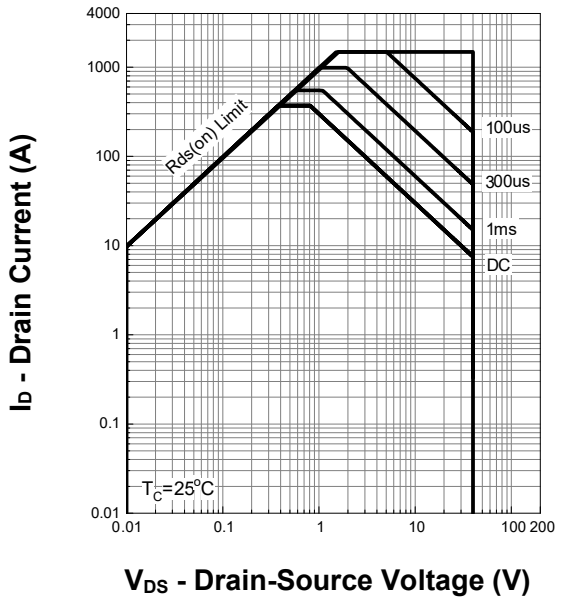
Power Capability



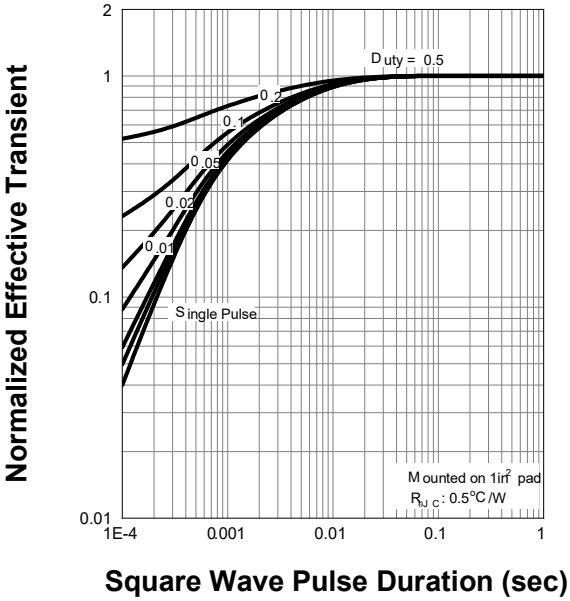
Current Capability



Safe Operating Area

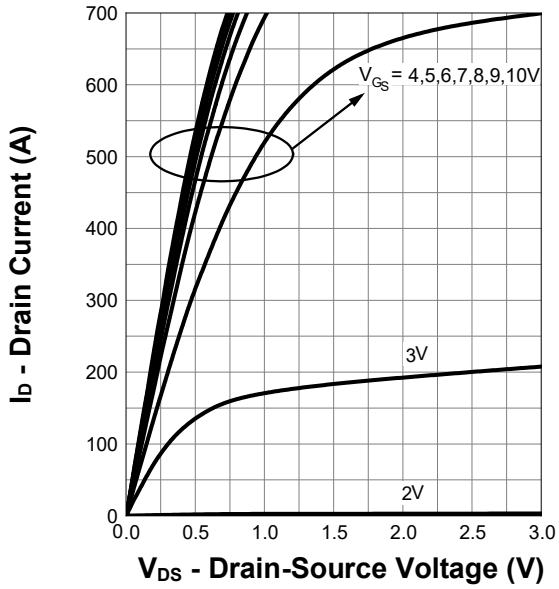


Transient Thermal Impedance

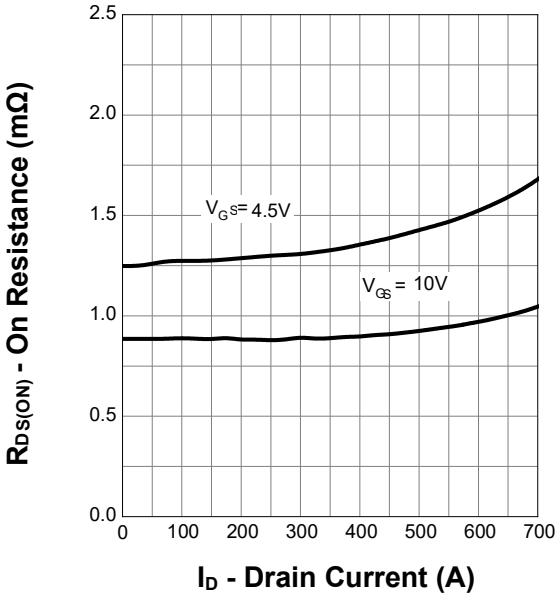


7. Typical Characteristics (cont.)

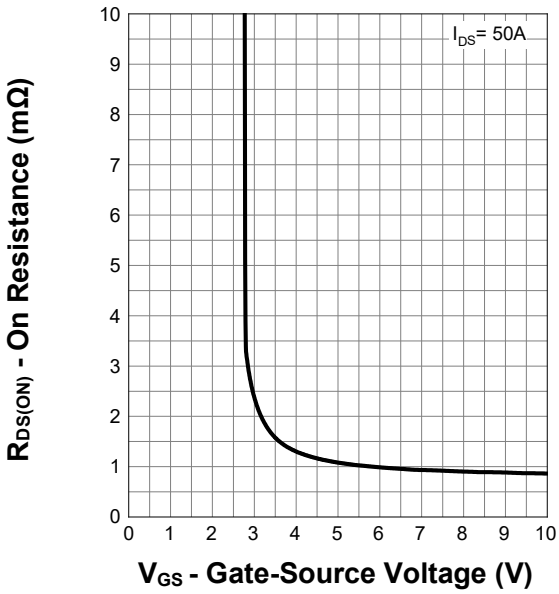
Output Characteristics



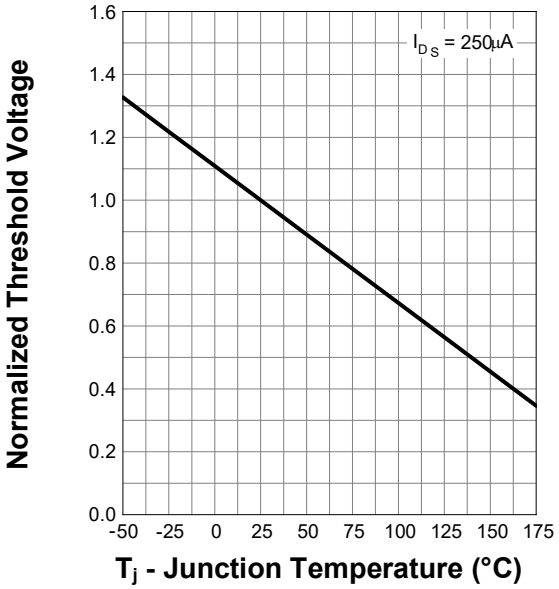
On Resistance



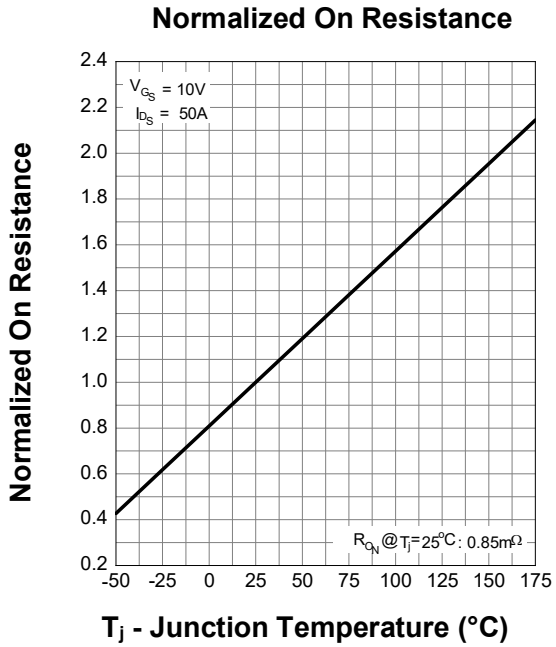
Transfer Characteristics

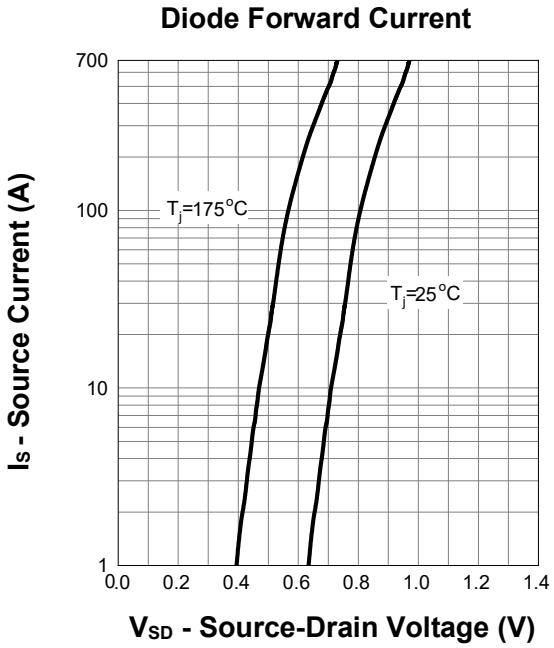


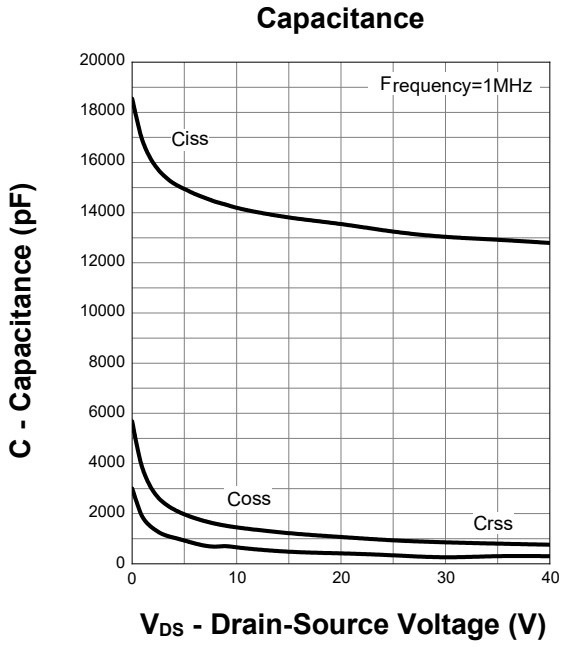
Normalized Threshold Voltage

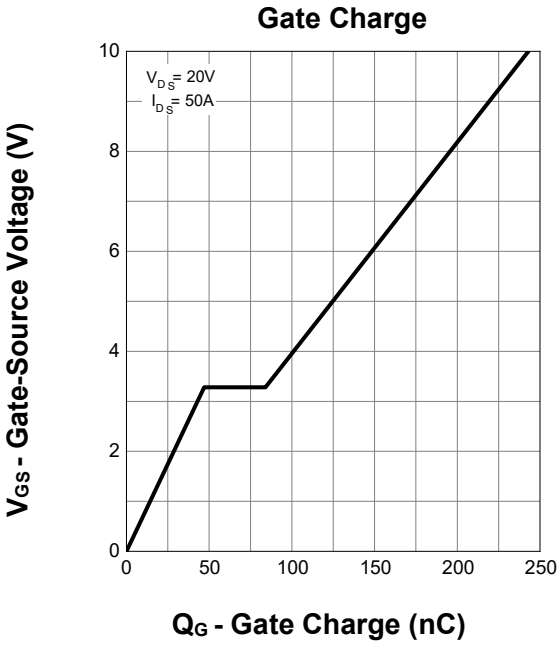


7. Typical Characteristics (cont.)



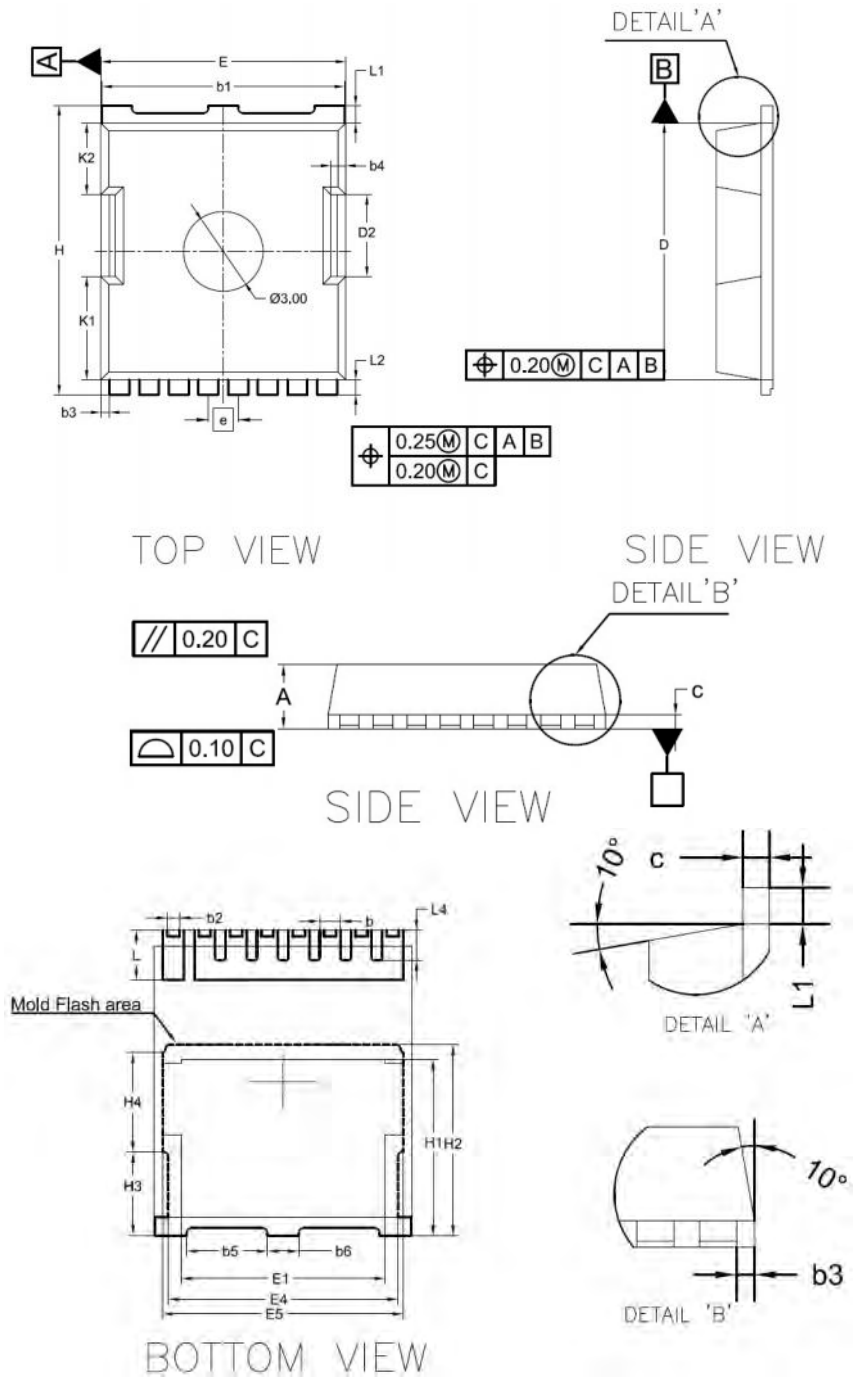






8. Package Dimensions

TOLL-8L Package



8. Package Dimensions

TOLL-8L Package

Symbol	Dimensions In Millimeters			Dimensions In INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	2.200	2.300	2.400	0.087	0.091	0.094
c	0.492	0.500	0.508	0.019	0.020	0.021
D	10.280	10.380	10.480	0.405	0.409	0.413
E	9.800	9.900	10.000	0.386	0.390	0.394
e	1.20 BSC			0.047 BSC		
H	11.580	11.680	11.780	0.456	0.460	0.464
H1	6.650	6.750	6.850	0.262	0.266	0.270
H2	7.300			0.287		
H3	3.200			0.126		
H4	3.800			0.150		
K1	4.180			0.165		
K2	2.900			0.114		
D2	3.300			0.130		
b	0.700	0.800	0.900	0.028	0.031	0.035
b1	9.700	9.800	9.900	0.382	0.386	0.390
b2	0.420	0.460	0.500	0.017	0.018	0.020
b3	0.350			0.014		
b4	0.600			0.024		
b5	3.100			0.122		
b6	1.200			0.047		
L	1.700	1.900	2.100	0.067	0.075	0.083
L1	0.700			0.028		
L2	0.600			0.024		
L4	1.050	1.150	1.250	0.041	0.045	0.049
L5	0.500	0.600	0.700	0.020	0.024	0.028
E1	7.800			0.310		
E4	8.800			0.350		
E5	9.200			0.360		