

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Surface-mounted package
- ☒ Super Trench
- ☒ Advanced trench cell design
- ☒ MSL1

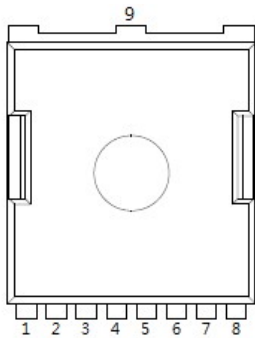
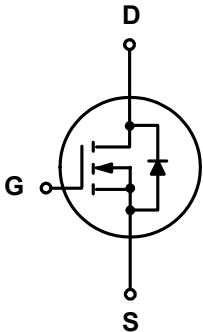
1.2 Applications

- ☒ BMS
- ☒ Drones
- ☒ High power inverter system
- ☒ Light electric vehicles

1.3 Quick reference

- ☒ $BV \geq 100\text{ V}$
- ☒ $P_{tot} \leq 500\text{ W}$
- ☒ $I_D \leq 360\text{ A}$
- ☒ $R_{DS(ON)} \leq 1.5\text{ m}\Omega @ V_{GS} = 10\text{ V}$

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)		

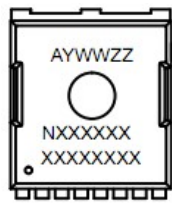
3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DS}	Drain-Source Voltage	T _C = 25 °C	100	-	V
V _{GS}	Gate-Source Voltage	T _C = 25 °C	-	±20	V
I _D *	Drain Current (DC)	T _C = 25 °C, V _{GS} = 10 V	-	450	A
		T _C = 100 °C, V _{GS} = 10 V	-	285	A
I _{DM} *,**	Drain Current (Pulsed)	T _C = 25 °C, V _{GS} = 10 V	-	1800	A
P _{tot}	Drain power dissipation	T _C = 25 °C	-	500	W
T _{stg}	Storage Temperature		-55	175	°C
T _J	Junction Temperature		-	175	°C
I _S	Continuous-Source Current	T _C = 25 °C	-	450	A
E _{AS}	Single Pulsed Avalanche Energy	V _{DD} =50V , L=0.5mH	-	1800	mJ
R _{θJA} **	Thermal Resistance- Junction to Ambient		-	40	°C/W
R _{θJC} **	Thermal Resistance- Junction to Case		-	0.25	

Notes :

- * Pulse width ≤ 300 μs, duty cycle ≤ 2 %
- ** Surface Mounted on minimum footprint pad area.
- *** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP013N10T	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP013N10T	TOLL-8L			2000	

Note: UOE defines " Green " as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C)

6. Electrical Characteristics ($T_A=25^\circ$ Unless Otherwise Noted)

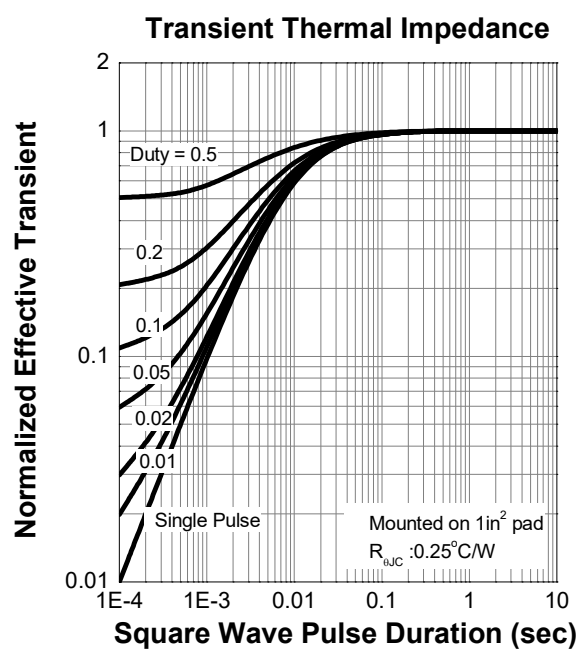
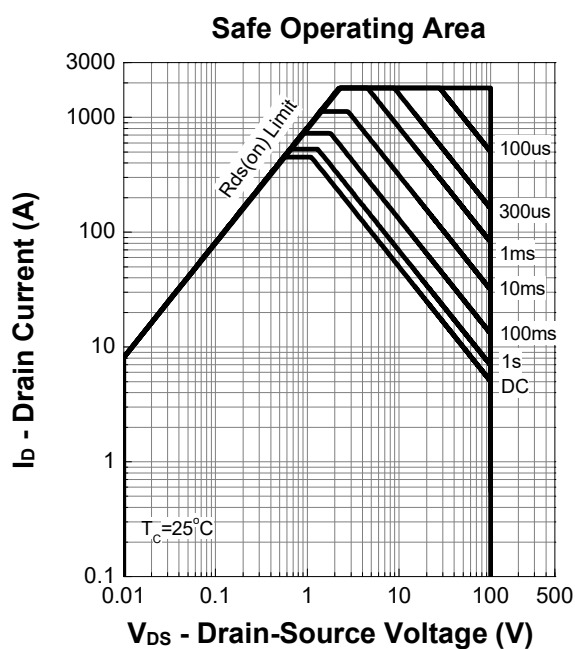
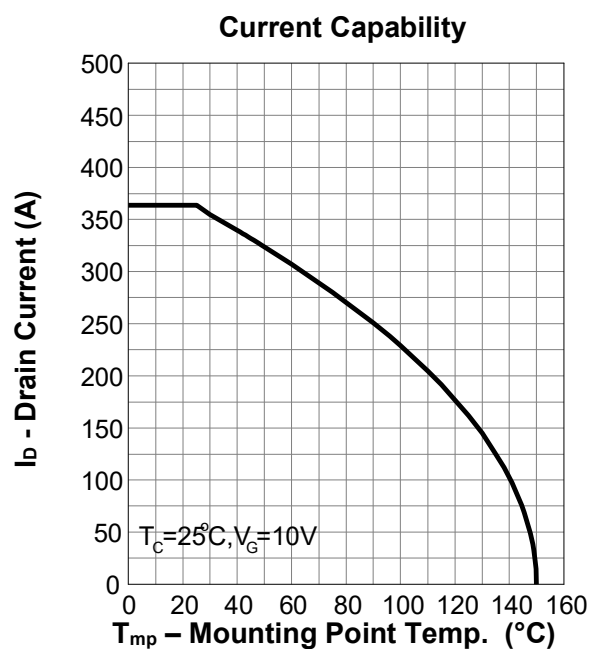
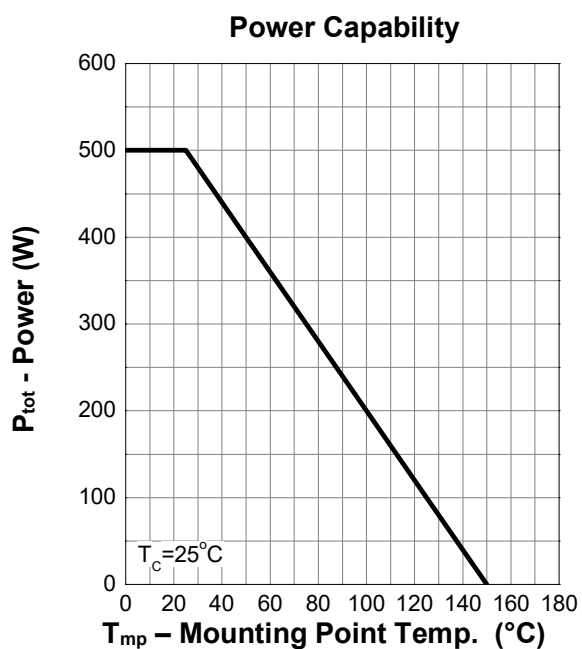
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	100	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	2	-	4	V
I _{DSS}	Drain Leakage Current	V _{DS} = 80 V, V _{GS} = 0 V	-	-	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} = 80 A	-	1.3	1.5	m Ω
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 30 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} = 30 A, V _{GS} = 0 V di _{SD} /dt = 100 A/μs	-	88	-	nS
Q _{rr}	Reverse Recovery Charge		-	221	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 50 V Frequency = 1 MHz	-	14200	-	pF
C _{oss}	Output Capacitance		-	4000	-	
C _{rss}	Reverse Transfer Capacitance		-	935	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 50 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 1.66 Ω, I _{DS} = 30 A	-	45	-	nS
t _r	Turn-on Rise Time		-	52	-	
t _{d(off)}	Turn-off Delay Time		-	120	-	
t _f	Turn-off Fall Time		-	50	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} = 50 V, V _{GS} = 10 V, I _{DS} = 30 A	-	241	-	nC
Q _{gs}	Gate-Source Charge		-	65	-	
Q _{gd}	Gate-Drain Charge		-	66	-	

Notes :

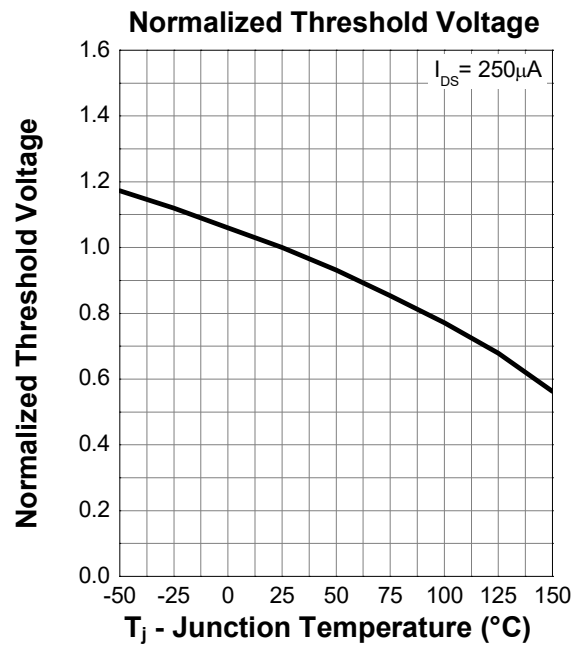
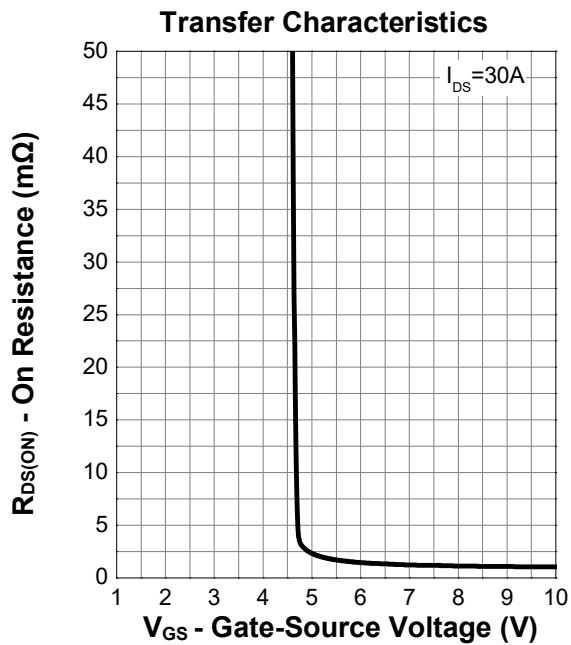
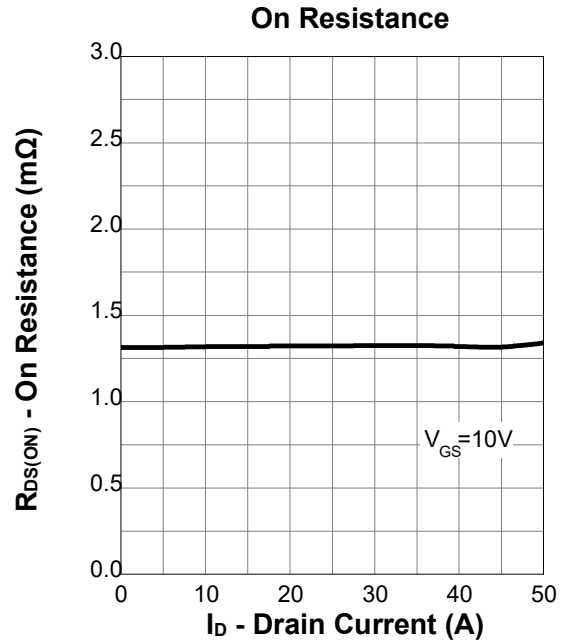
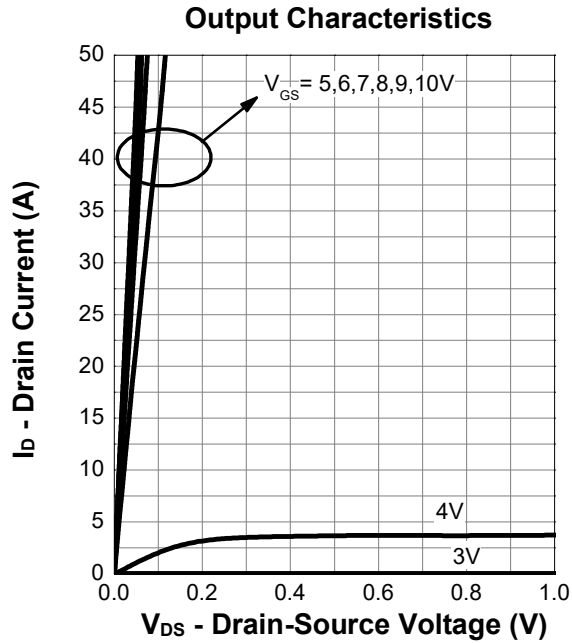
a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

b : Guaranteed by design, not subject to production testing

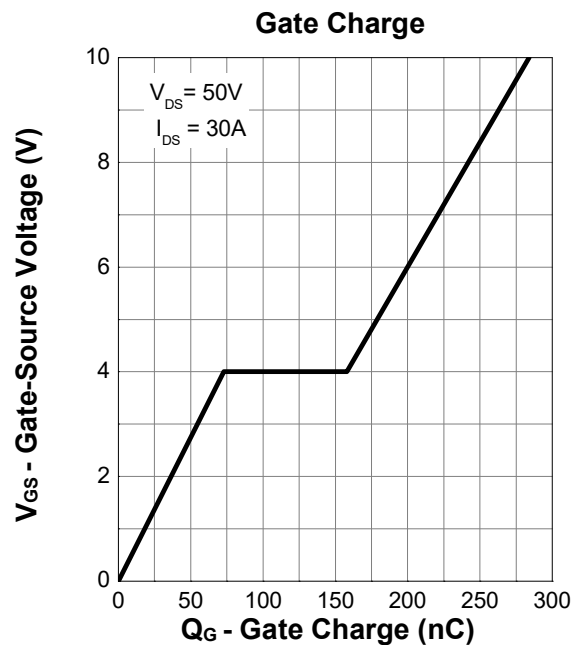
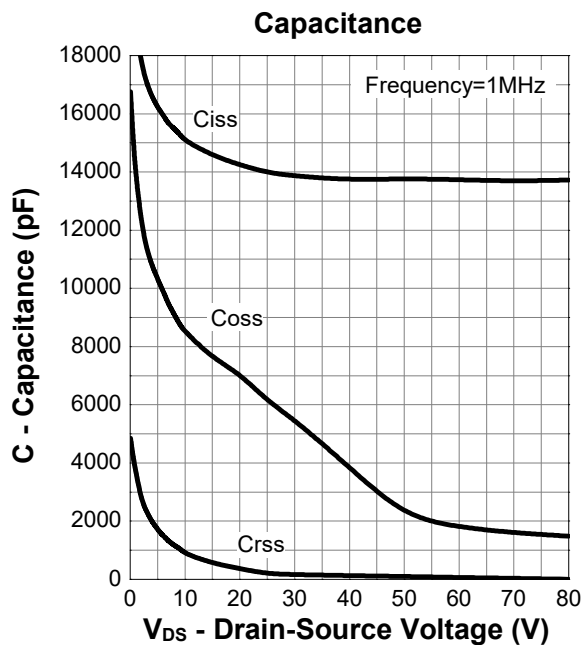
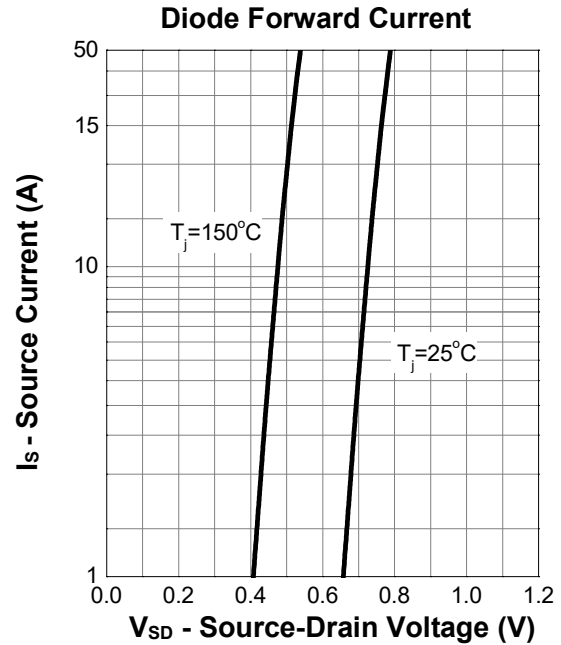
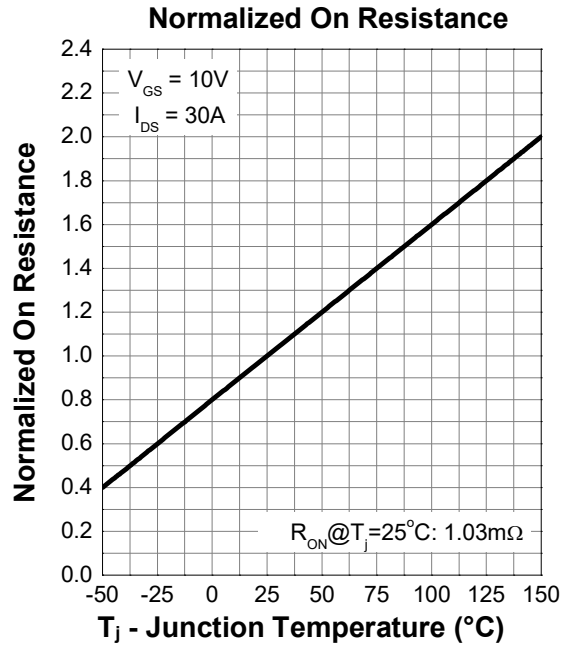
7. Typical Characteristics



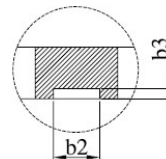
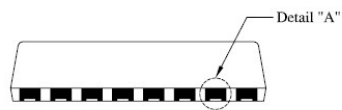
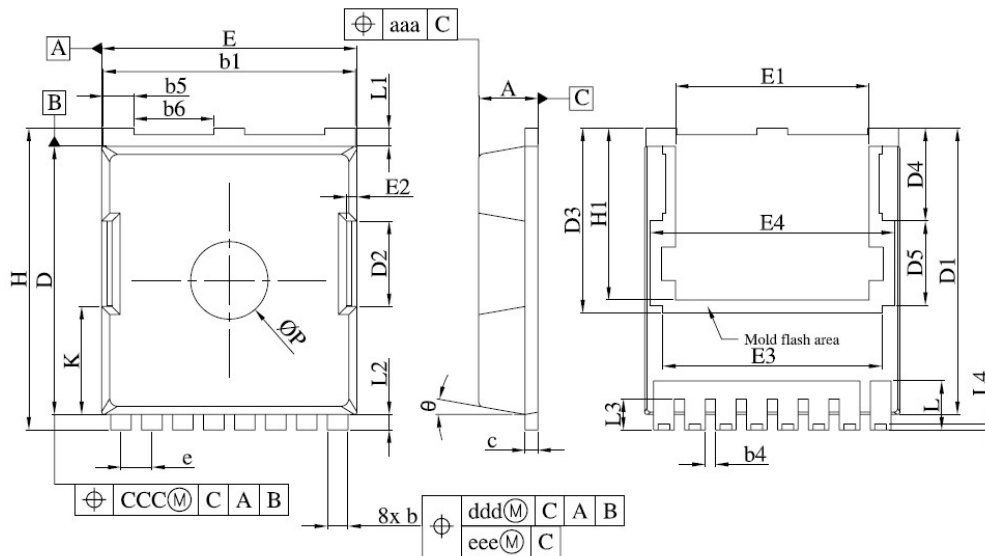
7. Typical Characteristics (cont.)



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	0.36	0.55
b3	0.05	/
b4	0.30	0.50
b5	1.10	1.30
b6	3.00	3.20
c	0.40	0.60
D	10.28	10.55
D1	10.98	11.18
D2	3.20	3.40
D3	7.15	
D4	3.59	
D5	3.26	
e	1.10	1.30
E	9.80	10.00
E1	7.40	7.60

Symbol	Dimensions In Millimeters	
	MIN.	MAX.
E2	7.40	7.60
E3	8.50	
E4	9.46	
H	11.50	11.85
H1	6.55	6.75
K	4.08	4.28
L	1.60	2.10
L1	0.50	0.90
L2	0.50	0.70
L3	1.00	1.30
L4	0.13	0.33
P	2.85	3.15
θ	10°REF	
aaa	0.20	
ccc	0.20	
ddd	0.25	
eee	0.20	