N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

1.2 Applications

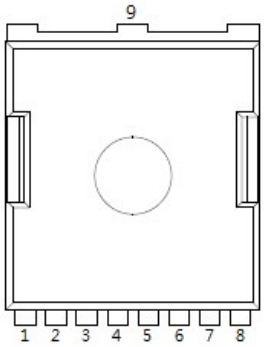
- ☑ BMS
- ☑ Drones
- ☑ High power inverter system
- ☑ Light electric vehicles

1.3 Quick reference

- ☑ BV ≧ 100 V
- ☑ P_{tot} ≦ 500 W
- ☑ I_D ≦ 400A
- ☑ $R_{DS(ON)}$ ≦ 0.95mΩ @ V_{GS} = 10 V
- ☑ $R_{DS(ON)}$ ≦ 1.55mΩ @ V_{GS} = 6 V

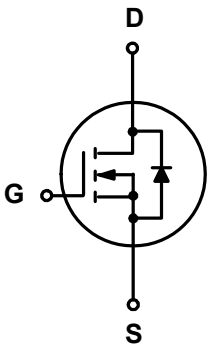
2. Pin Description

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



Top View

TOLL



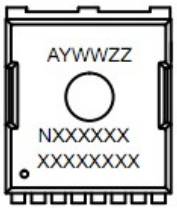
3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	100	-	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	±20	V
I_D*	Drain Current (DC)	T_C = 25 ℃, V_{GS} = 10 V	-	400	A
		T_C = 100 ℃, V_{GS} = 10 V	-	324	A
I_{DM}*,**	Drain Current (Pulsed)	T_C = 25 ℃, V_{GS} = 10 V	-	1600	A
P_{tot}	Drain power dissipation	T_C = 25 ℃	-	500	W
T_{stg}	Storage Temperature		-55	175	℃
T_J	Junction Temperature		-	175	℃
I_S	Continuous-Source Current	T_C = 25 ℃	-	400	A
E_{AS}	Single Pulsed Avalanche Energy	V_{DD}=50V , L=1.0mH	-	3362	mJ
$R_{\theta JA}$**	Thermal Resistance- Junction to Ambient		-	46	℃/W
$R_{\theta JC}$**	Thermal Resistance- Junction to Case		-	0.3	

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
UP0D9N10CT	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP0D9N10CT	**TOLL-8L**			**2000**	

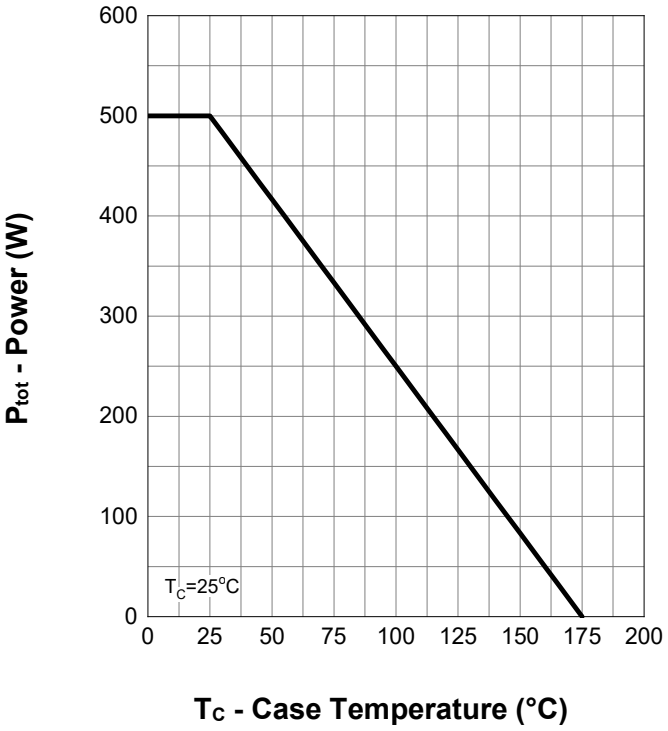
6. Electrical Characteristics (T_A=25 ° Unless Otherwise Noted)

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_{DS} = 0 V, V_{GS} = ± 20 V	-	-	±100	nA
$R_{DS(ON)}$Note1	On-State Resistance	V_{GS} = 10 V, I_{DS} = 50 A	-	0.83	0.95	mΩ
		V_{GS} = 6 V, I_{DS} = 30 A	-	1.15	1.55	
Diode Characteristics						
V_{SD}Note1	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	-	177	-	nS
Q_{rr}	Reverse Recovery Charge		-	277	-	nC
Dynamic CharacteristicsNote2						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 50 V Frequency = 1 MHz	-	15290	-	pF
C_{oss}	Output Capacitance		-	2433	-	
C_{rss}	Reverse Transfer Capacitance		-	255	-	
t_d(on)	Turn-on Delay Time	V_{DS} = 50 V, V_{GEN} = 10 V, R_G = 3.9 Ω, R_L = 1 Ω, I_{DS} = 50 A	-	43	-	nS
t_r	Turn-on Rise Time		-	126	-	
t_d(off)	Turn-off Delay Time		-	180	-	
t_f	Turn-off Fall Time		-	133	-	
Gate Charge Characteristics Note2						
Q_g	Total Gate Charge	V_{DS} = 50 V, V_{GS} = 10 V, I_{DS} = 50 A	-	286	-	nC
Q_{gs}	Gate-Source Charge		-	81	-	
Q_{gd}	Gate-Drain Charge		-	78	-	

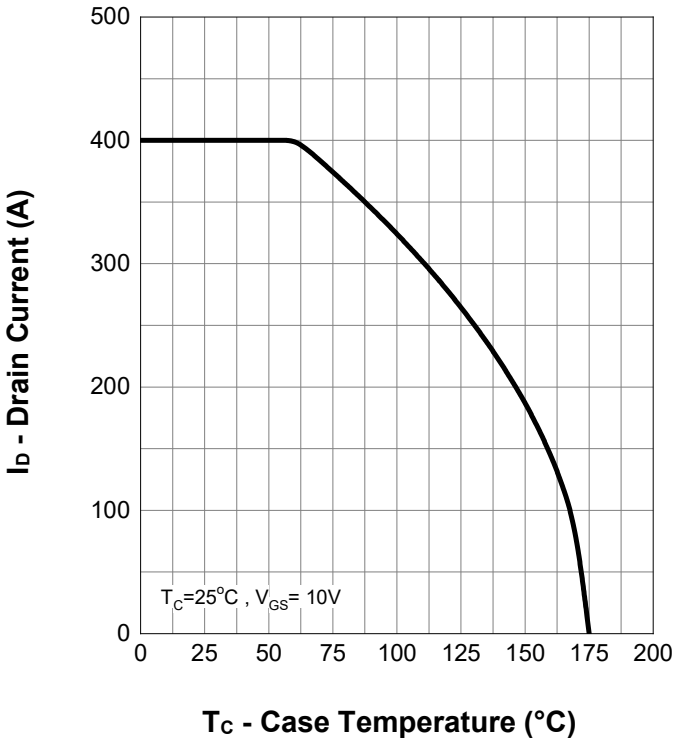
Note 1: Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
Note 2: Guaranteed by design, not subject to production testing.

7. Typical Characteristics

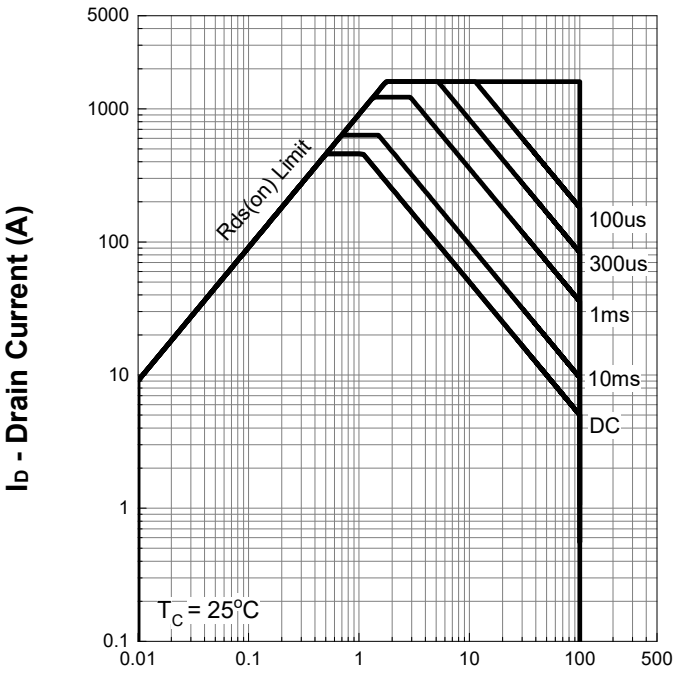
Power Capability



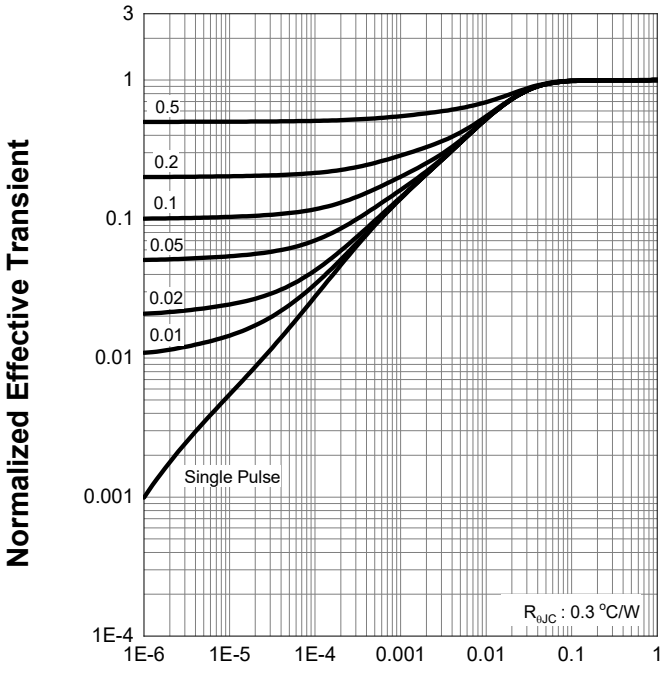
Current Capability



Safe Operating Area

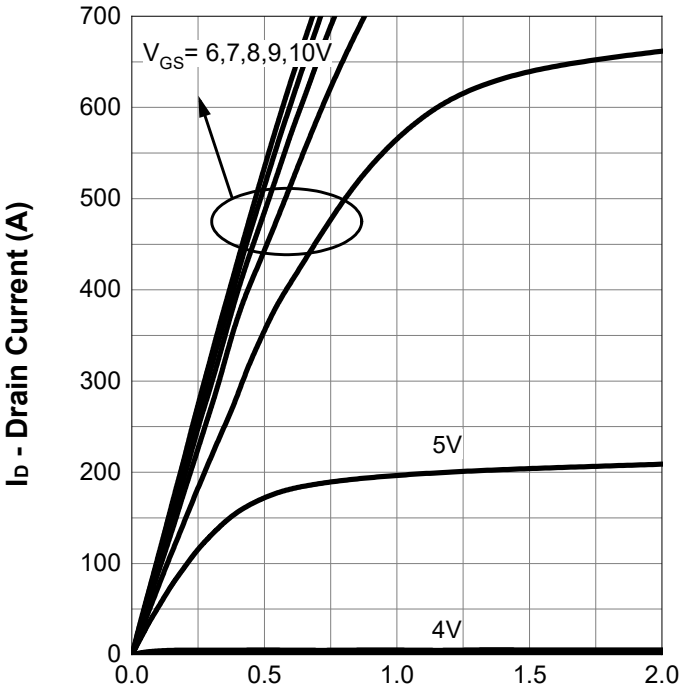


Transient Thermal Impedance

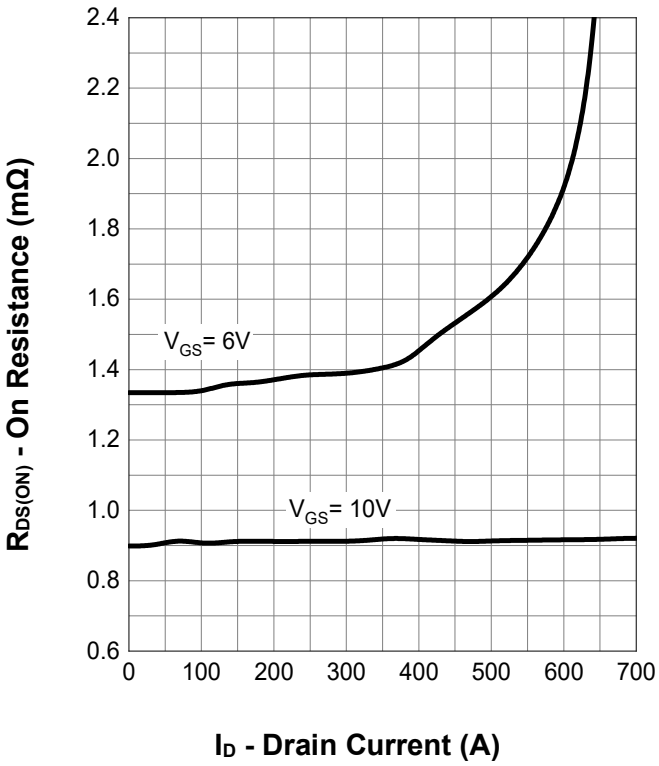


7. Typical Characteristics (cont.)

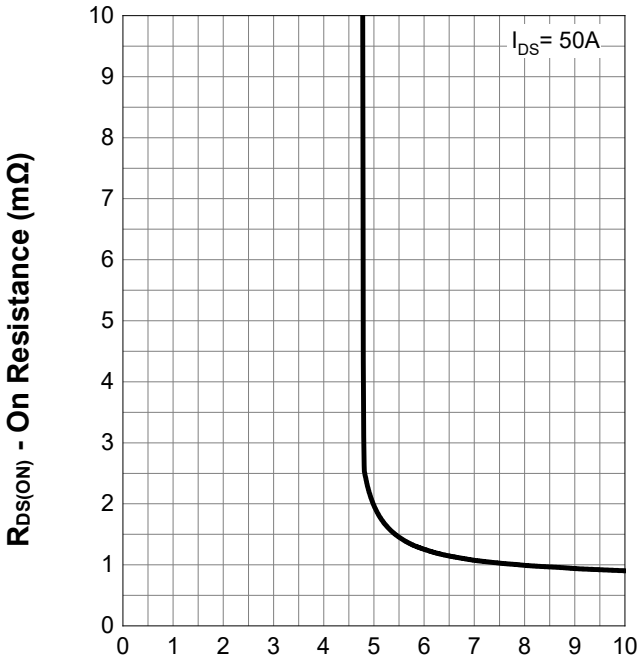
Output Characteristics



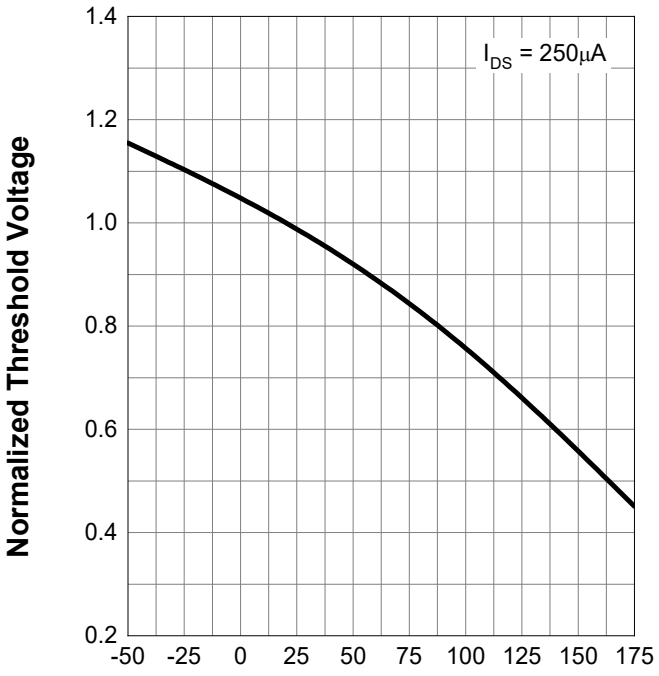
On Resistance



Transfer Characteristics

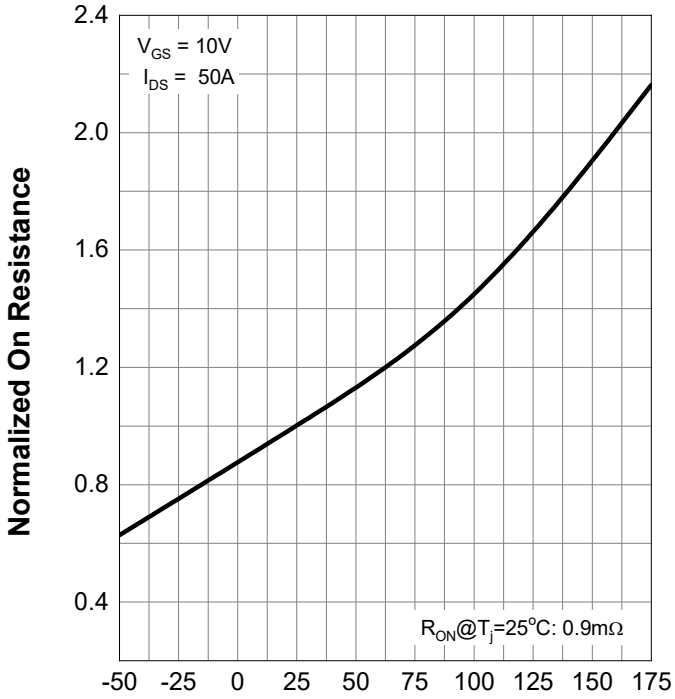


Normalized Threshold Voltage

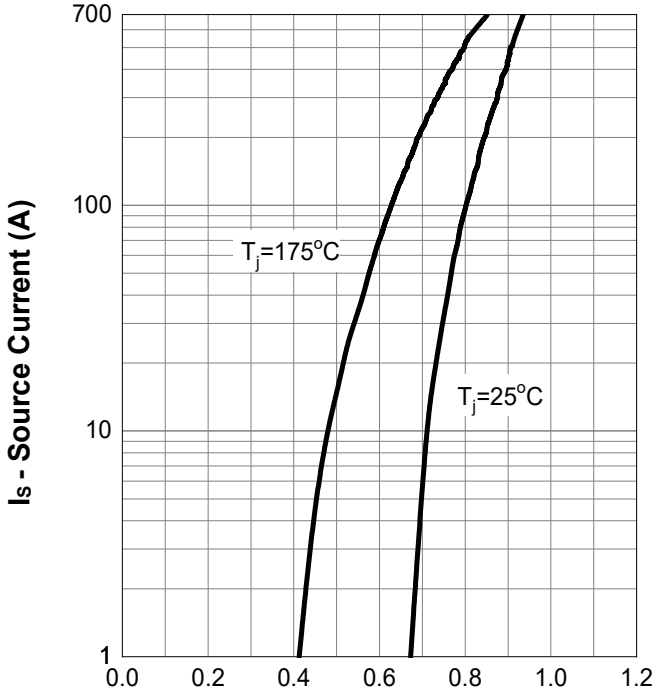


7. Typical Characteristics (cont.)

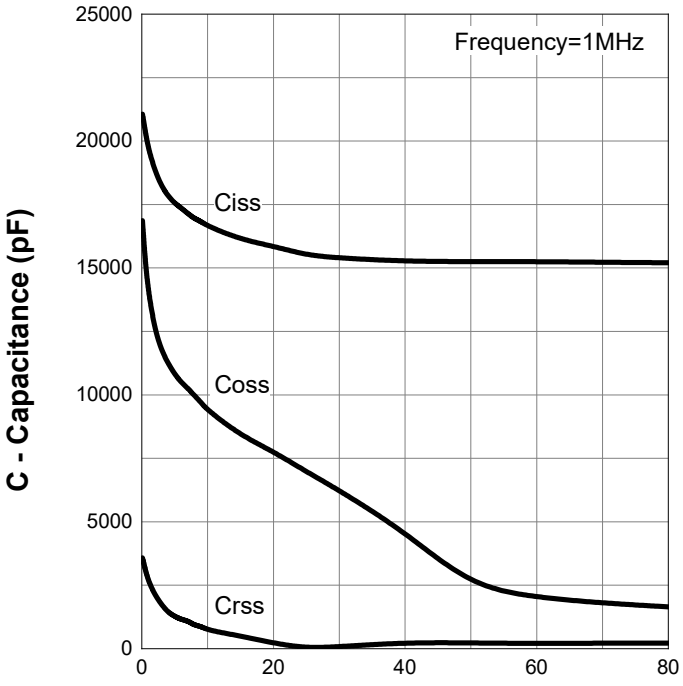
Normalized On Resistance



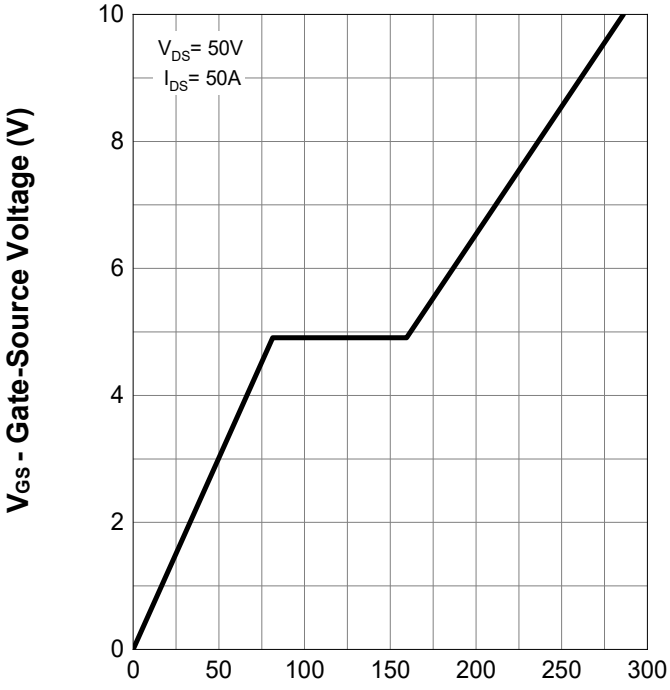
Diode Forward Current



Capacitance

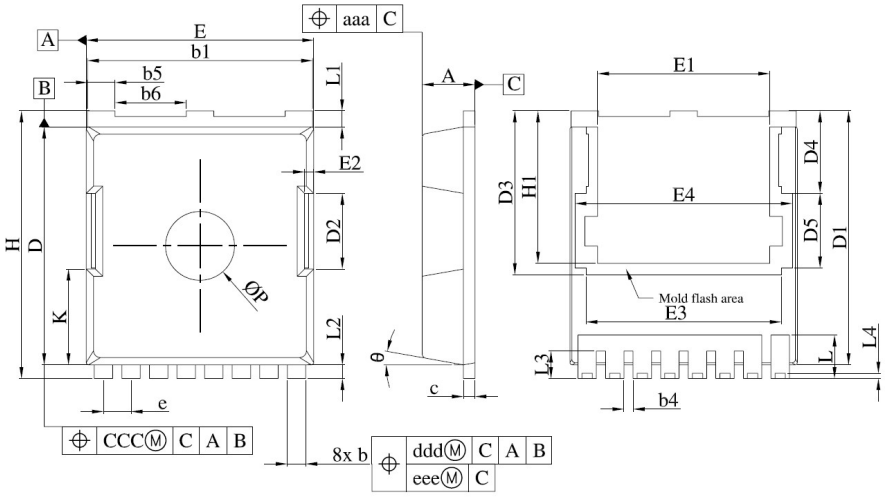


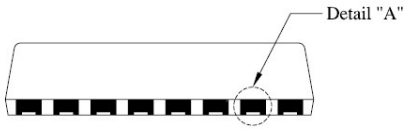
Gate Charge

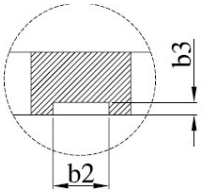


8. Package Dimensions

TOLL-8L Package







Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.36	0.45	0.55
b3	0.05	0.10	/
b4	0.30	0.40	0.50
b5	1.10	1.20	1.30
b6	3.00	3.10	3.20
c	0.40	0.50	0.60
D	10.28	10.38	10.55
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	7.15		
D4	3.59		
D5	3.26		
e	1.10	1.20	1.30
E	9.80	9.90	10.00
E1	7.40	7.50	7.60
E2	0.30	0.40	0.50
E3	8.50		
E4	9.46		
H	11.50	11.68	11.85
H1	6.55	6.65	6.75
K	4.08	4.18	4.28
L	1.60	1.90	2.10
L1	0.50	0.70	0.90
L2	0.50	0.60	0.70
L3	1.00	1.20	1.30
L4	0.13	0.23	0.33
p	2.85	3.00	3.15
θ	10°REF		
aaa	0.20		
ccc	0.20		
ddd	0.25		
eee	0.20		