

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

1.2 Applications

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

1.3 Quick reference

- $BV \geq 100\text{ V}$
- $R_{DS(ON)} \leq 1.25\text{m}\Omega @ V_{GS} = 10\text{ V}$
- $P_{tot} \leq 375\text{ W}$
- $R_{DS(ON)} \leq 1.85\text{m}\Omega @ V_{GS} = 6\text{ V}$
- $I_D \leq 300\text{ A}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
8	Gate(G)		
1,2,3,4,5,6,7	Source(S)		
9,10,11,12,13,14,15,16	Drain(D)		
Tap	Drain(D)		
		<p>Top View</p> <p>TOLT</p>	

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	-	300	A
		T _C = 100 °C, V _{GS} = 10 V	-	258	A
I _{DM} *,**	Drain Current (Pulsed)	T _C = 25 °C, V _{GS} = 10 V	-	1200	A
P _{tot}	Drain power dissipation	T _C = 25 °C	-	375	W
T _{stg}	Storage Temperature		-55	175	°C
T _J	Junction Temperature		-	175	°C
I _S	Continuous-Source Current	T _C = 25 °C	-	300	A
E _{AS}	Single Pulsed Avalanche Energy	V _{DD} =50V , L=1.0mH	-	2450	mJ
R _{θJA} **	Thermal Resistance- Junction to Ambient		-	52	°C/W
R _{θJC} **	Thermal Resistance- Junction to Case		-	0.4	

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
UP009N10LT	<div style="text-align: center;"> AYWW01 009N10 XXXXXX </div>

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP009N10LT	TOLT			2000	

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

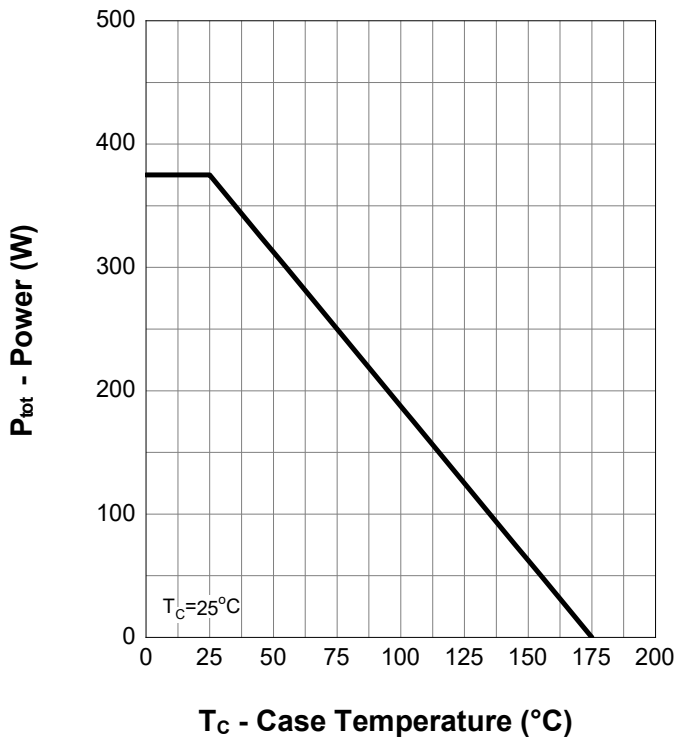
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 250\ \mu\text{A}$	100	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = -250\ \mu\text{A}$	2	-	4	V
I_{DSS}	Drain Leakage Current	$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
I_{GSS}	Gate Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
$R_{DS(ON)}^{Note1}$	On-State Resistance	$V_{GS} = 10\text{ V}, I_{DS} = 50\text{ A}$	-	1.1	1.25	m Ω
		$V_{GS} = 6\text{ V}, I_{DS} = 30\text{ A}$	-	1.55	1.85	
Diode Characteristics						
V_{SD}^{Note1}	Diode Forward Voltage	$I_{SD} = 50\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.3	V
t_{rr}	Reverse Recovery Time	$I_{DS} = 50\text{ A}, V_{GS} = 0\text{ V}$ $dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	89	-	nS
Q_{rr}	Reverse Recovery Charge		-	160	-	nC
Dynamic Characteristics^{Note2}						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$ Frequency = 1 MHz	-	13374	-	pF
C_{oss}	Output Capacitance		-	2026	-	
C_{riss}	Reverse Transfer Capacitance		-	118	-	
$t_d(on)$	Turn-on Delay Time	$V_{DS} = 50\text{ V}, V_{GEN} = 10\text{ V},$ $R_G = 3.9\ \Omega, R_L = 1\ \Omega,$ $I_{DS} = 50\text{ A}$	-	41	-	nS
t_r	Turn-on Rise Time		-	116	-	
$t_d(off)$	Turn-off Delay Time		-	137	-	
t_f	Turn-off Fall Time		-	80	-	
Gate Charge Characteristics^{Note2}						
Q_g	Total Gate Charge	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V},$ $I_{DS} = 50\text{ A}$	-	222	-	nC
Q_{gs}	Gate-Source Charge		-	75	-	
Q_{gd}	Gate-Drain Charge		-	49	-	

Note 1: Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

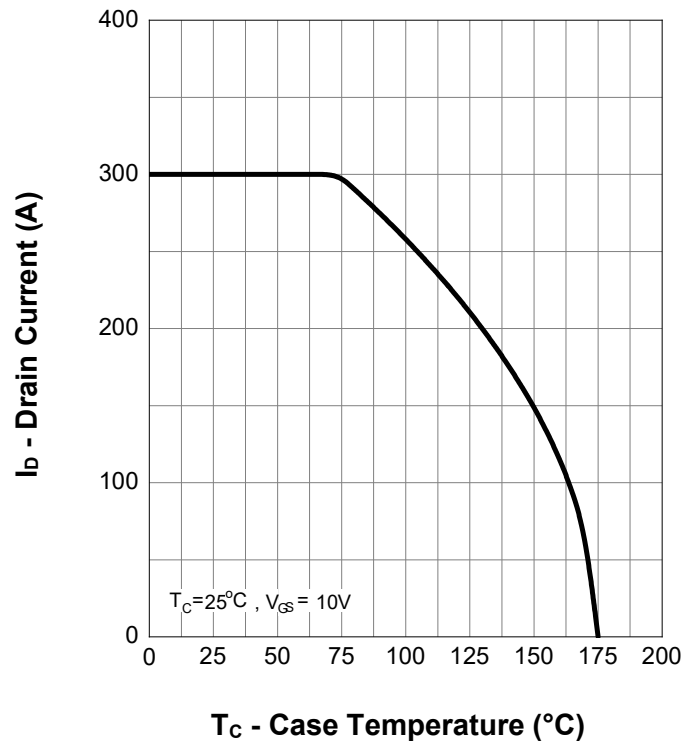
Note 2: Guaranteed by design, not subject to production testing.

7. Typical Characteristics

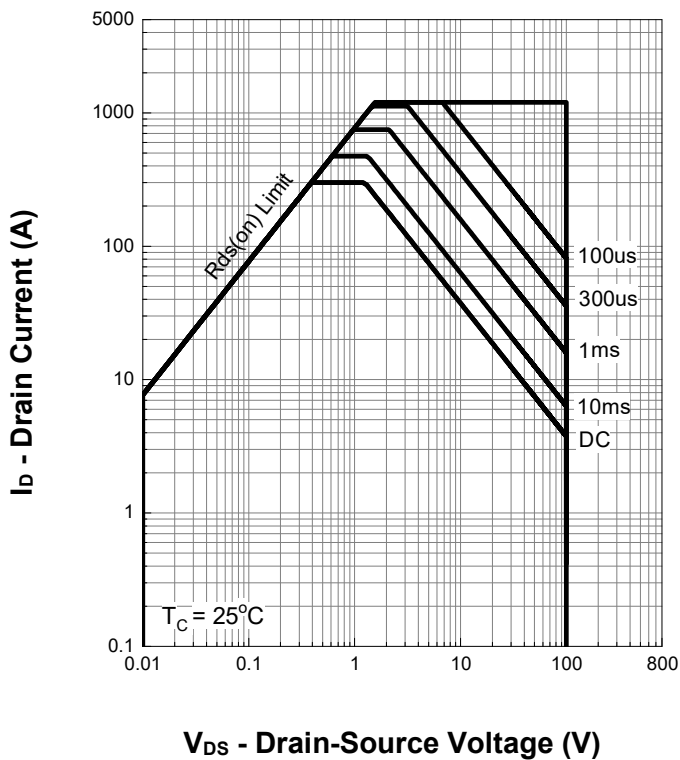
Power Capability



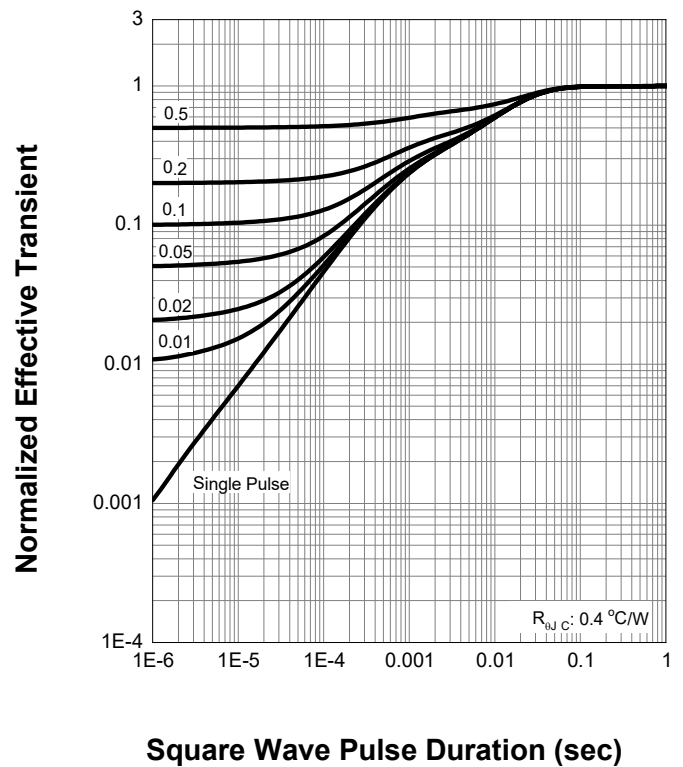
Current Capability



Safe Operating Area

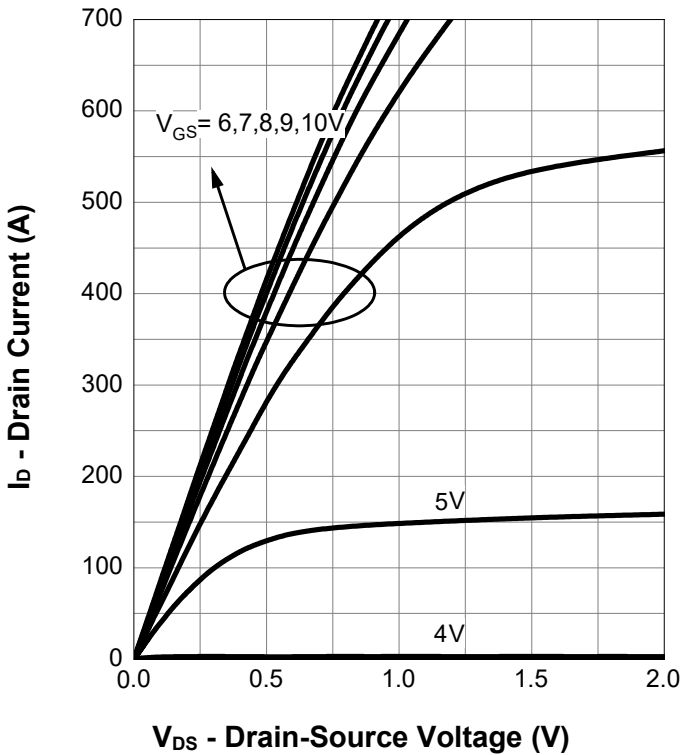


Transient Thermal Impedance

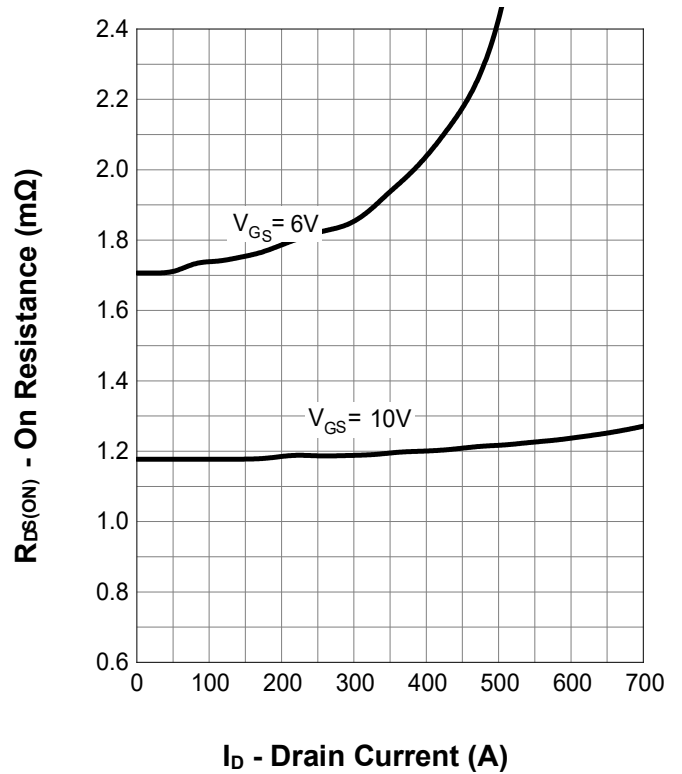


7. Typical Characteristics (cont.)

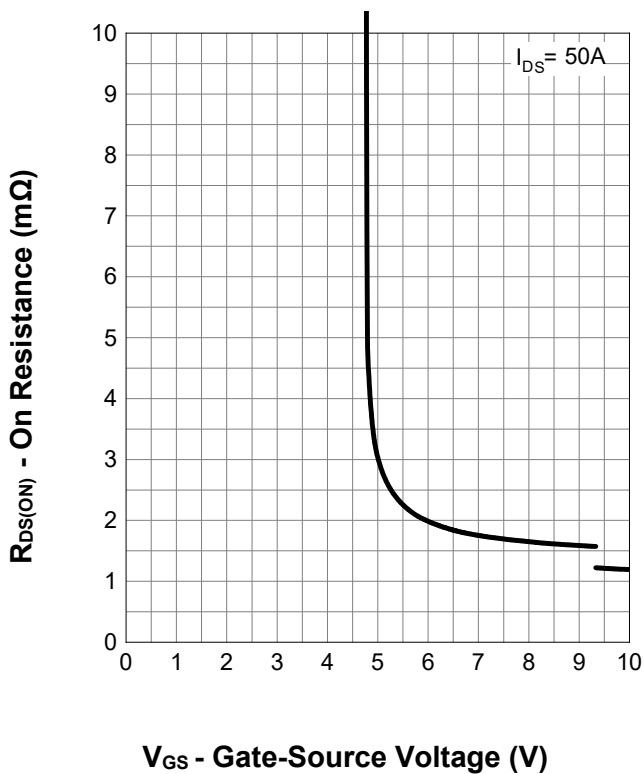
Output Characteristics



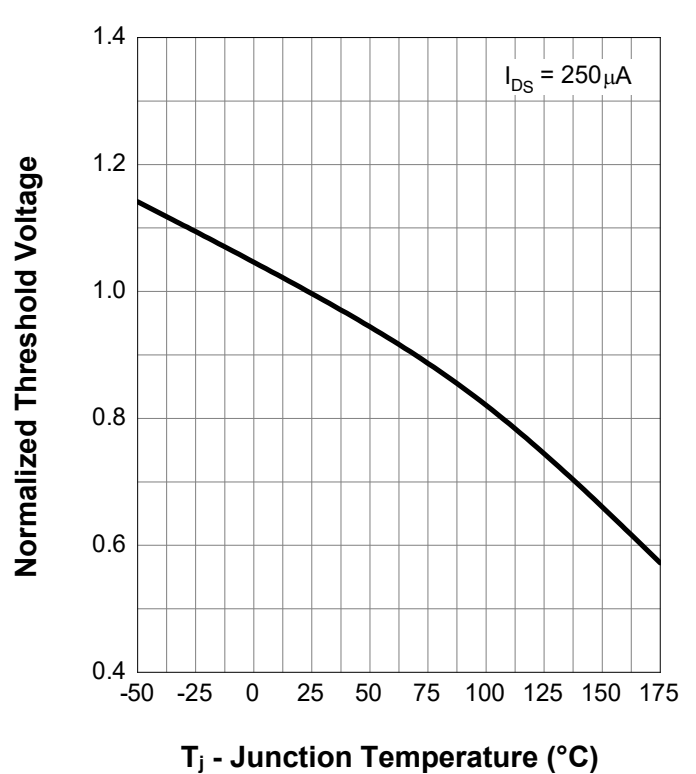
On Resistance



Transfer Characteristics

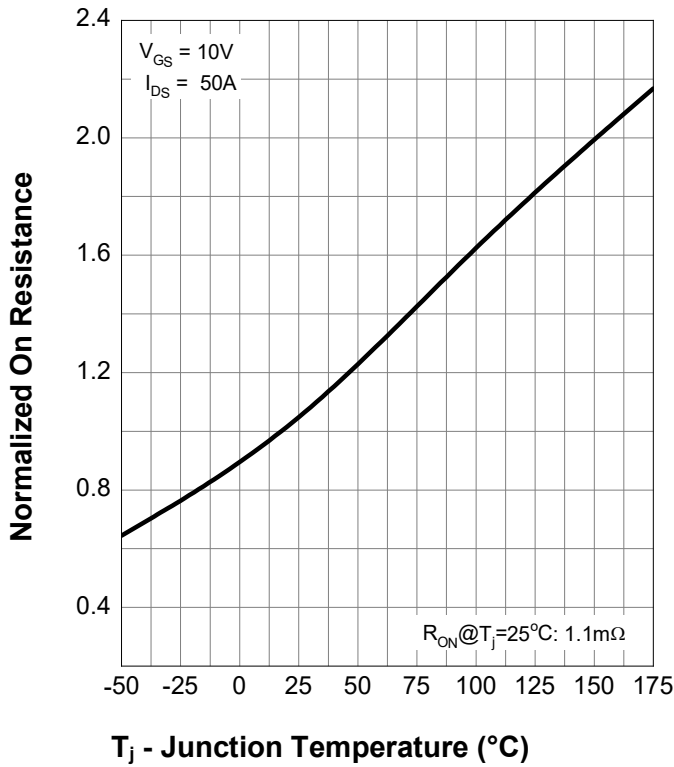


Normalized Threshold Voltage

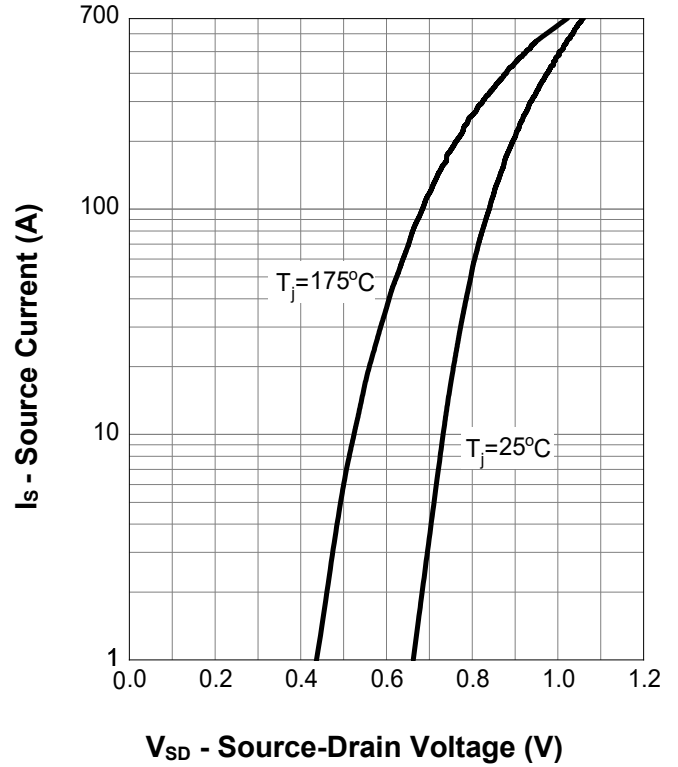


7. Typical Characteristics (cont.)

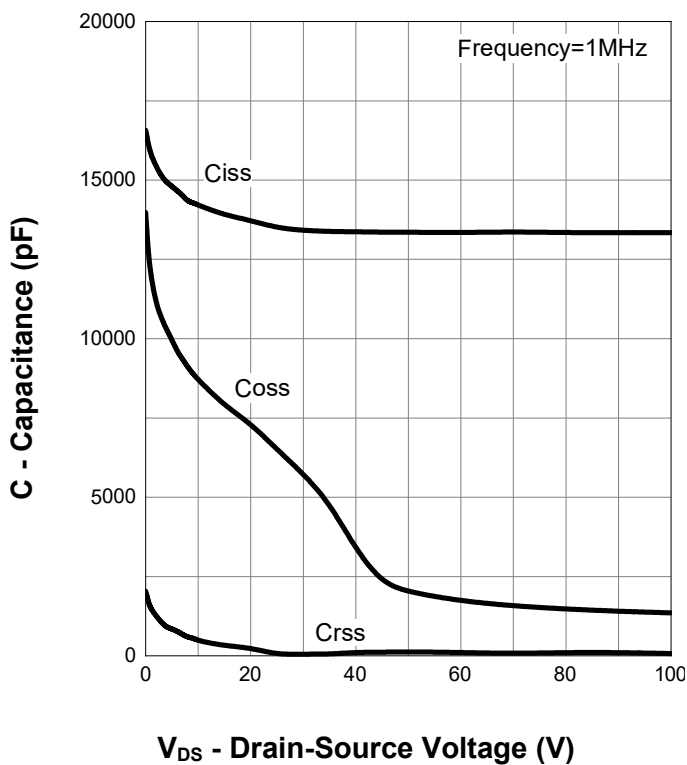
Normalized On Resistance



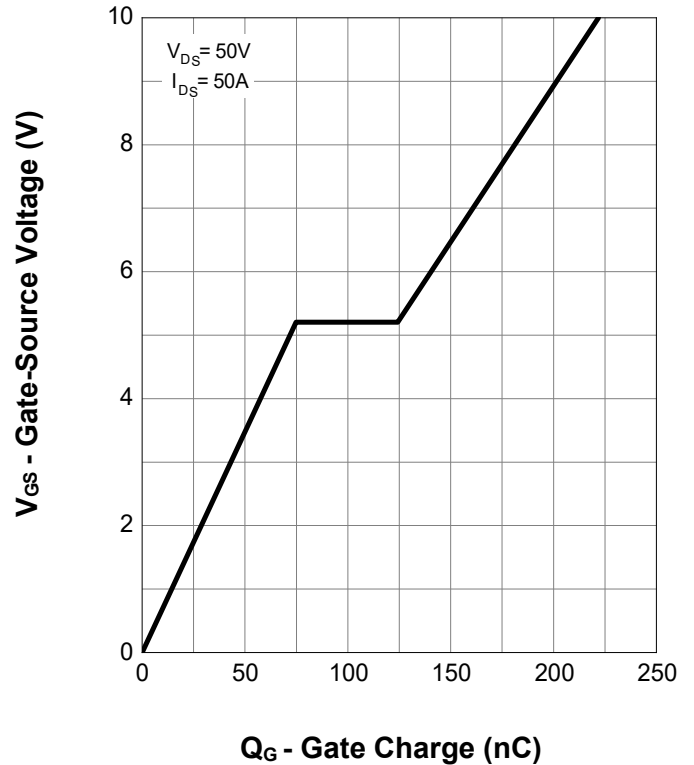
Diode Forward Current



Capacitance

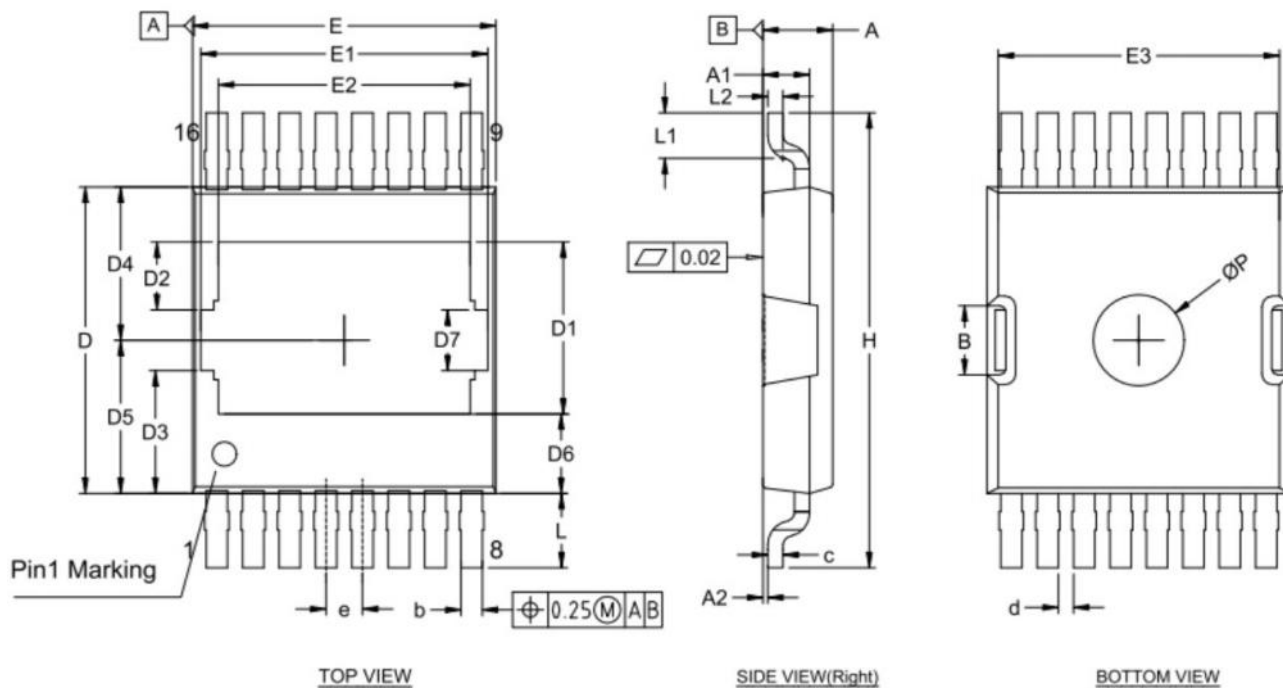


Gate Charge



8. Package Dimensions

TOLT Package



Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.
A	2.250	2.300	2.350
A1	1.440	1.540	1.640
A2	0.010	-	0.160
b	0.600	0.700	0.800
c	0.400	0.500	0.600
d	0.400	0.500	0.600
e	1.200 BSC		
D	10.000	10.100	10.300
D1	5.470	5.670	5.870
D2	2.040	2.240	2.440
D3	4.050 REF.		
D4	5.050 REF.		
D5	5.050 REF.		
D6	2.620 REF.		
D7	2.000 REF.		

Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.
E	9.700	10.000	10.100
E1	9.460 REF.		
E2	8.100	8.300	8.500
E3	9.070	9.270	9.470
H	14.800	15.000	15.200
L	2.250	2.450	2.650
L1	1.350	1.500	1.650
L2	0.500 BSC		
Øp	2.900	3.000	3.100
B	0.812	2.280	1.212
θ	1°	3°	5°
θ 1	6°	7°	8°