

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

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

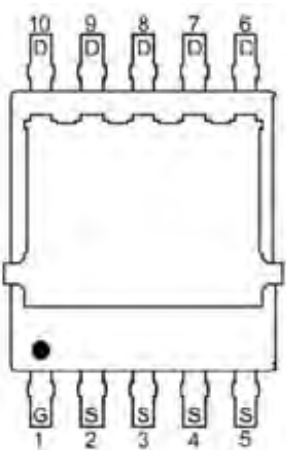
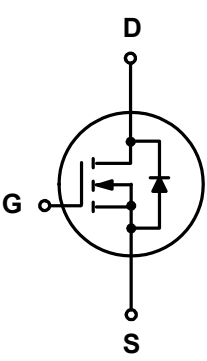
1.2 Applications

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

1.3 Quick reference

- ✓ $BV \geq 60 \text{ V}$
- ✓ $P_{tot} \leq 428 \text{ W}$
- ✓ $I_D \leq 473 \text{ A}$
- ✓ $R_{DS(ON)} \leq 0.9 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$
- ✓ $R_{DS(ON)} \leq 2.0 \text{ m}\Omega @ V_{GS} = 6 \text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
2,3,4,5	Source	 Top View SSO10T	
1	Gate		
6,7,8,9,10,Tab	Drain		

3. Limiting Values

Symbol	Parameter		Rating	Unit
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D Note3	Drain Current (Silicon Limit)	$T_C = 25\text{ }^{\circ}\text{C}$	473	A
	Drain Current	$T_C = 25\text{ }^{\circ}\text{C}$	240	A
		$T_C = 100\text{ }^{\circ}\text{C}$	240	A
I_{DM}	Pulsed Source Current	$T_C = 25\text{ }^{\circ}\text{C}$	960	A
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	240	A
E_{AS}	Single Pulsed Avalanche Energy	$L = 1.0\text{mH}$	1250	mJ
P_{tot}	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	428	W
$R_{\theta JA}$ Note1	Thermal Resistance- Junction to Ambient		66	$^{\circ}\text{C} / \text{W}$
$R_{\theta JC}$	Thermal Resistance- Junction to Case		0.35	$^{\circ}\text{C} / \text{W}$
T_{stg}	Storage Temperature		-55~175	$^{\circ}\text{C}$
T_J	Junction Temperature		175	$^{\circ}\text{C}$

Note 1 : Surface Mounted on 1 in² pad area, $t \leq 10$ sec.

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

Note 3 : Limited by bonding wire.

4. Marking Information

Product Name	Marking
UP009N06LH	009N06H YWWXXX YWWXXX: Date Code

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP009N06LH	SSO10T			4500	

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

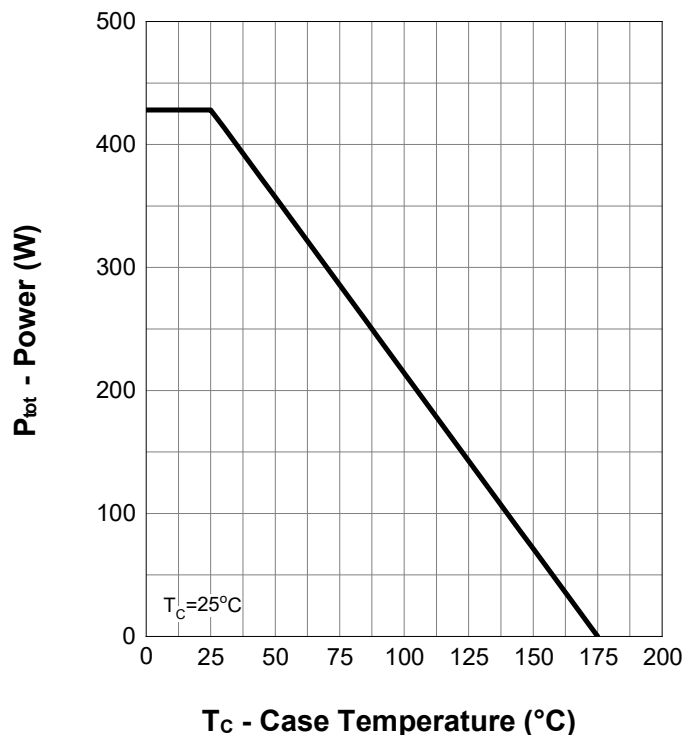
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	60	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	2	-	4	V
I _{DSS}	Drain Leakage Current	V _{DS} = 48 V, V _{GS} = 0 V	-	-	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	-	0.82	0.9	mΩ
		V _{GS} = 6 V, I _{DS} = 30 A	-	1.7	2.0	
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	-	43	-	nS
Q _{rr}	Reverse Recovery Charge		-	35	-	nC
Dynamic Characteristics ^{Note2}						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 30 V Frequency = 1 MHz	-	7403	-	pF
C _{oss}	Output Capacitance		-	1921	-	
C _{rss}	Reverse Transfer Capacitance		-	35	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 30 V, V _{GEN} = 10 V, R _G = 3.9 Ω, R _L = 0.6 Ω, I _{DS} = 50 A	-	27	-	nS
t _r	Turn-on Rise Time		-	98	-	
t _{d(off)}	Turn-off Delay Time		-	74	-	
t _f	Turn-off Fall Time		-	52	-	
Gate Charge Characteristics ^{Note2}						
Q _g	Total Gate Charge	V _{DS} = 30 V, V _{GS} = 10 V, I _{DS} = 50 A	-	127	-	nC
Q _{gs}	Gate-Source Charge		-	41	-	
Q _{gd}	Gate-Drain Charge		-	32	-	

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

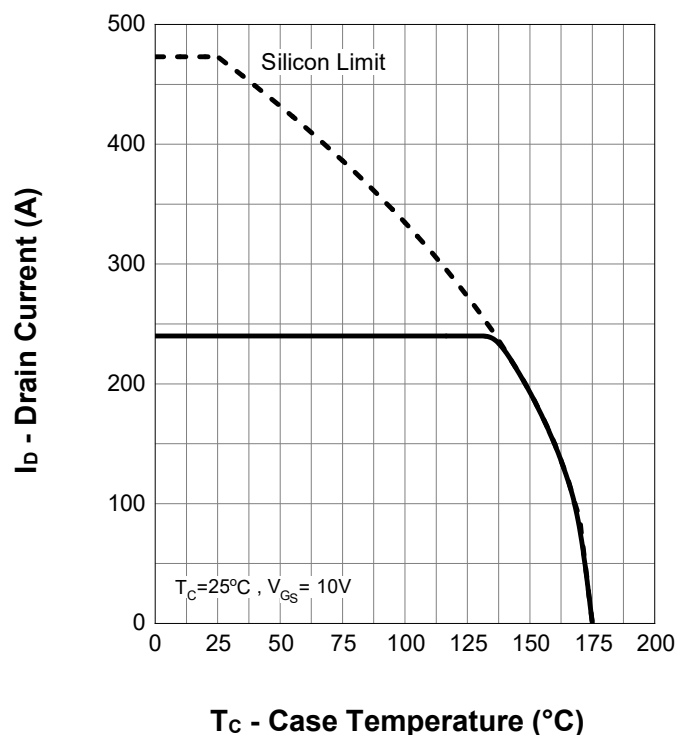
Note 2: Guaranteed by design, not subject to production testing.

7. Typical Characteristics

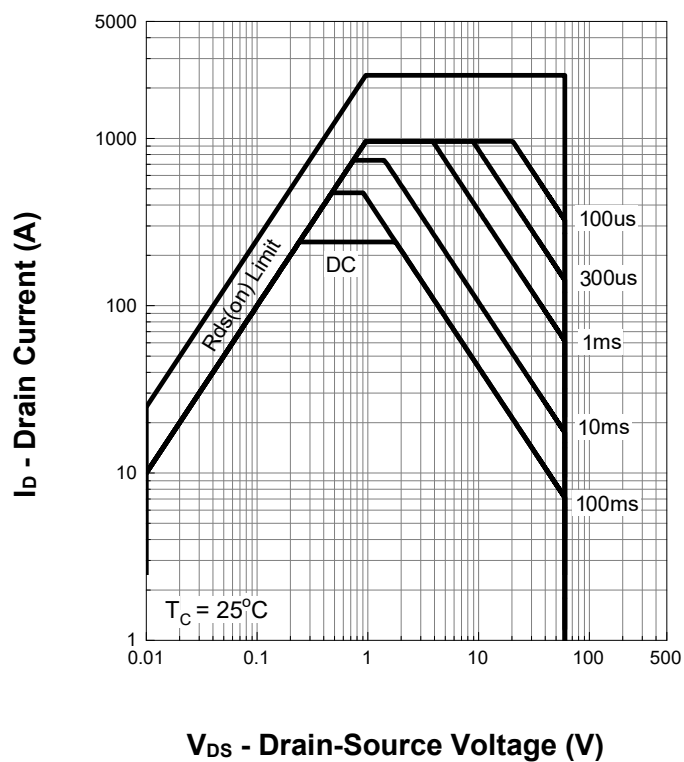
Power Capability



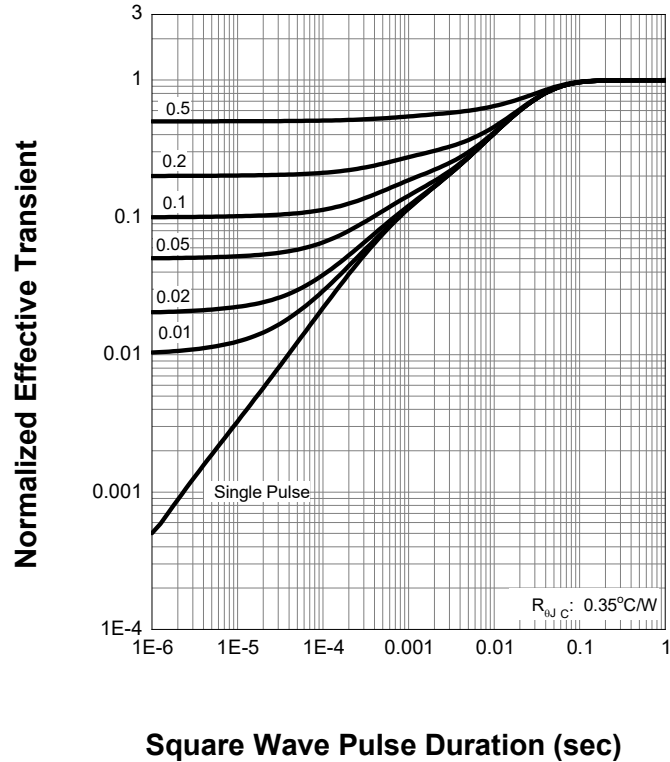
Current Capability



Safe Operating Area

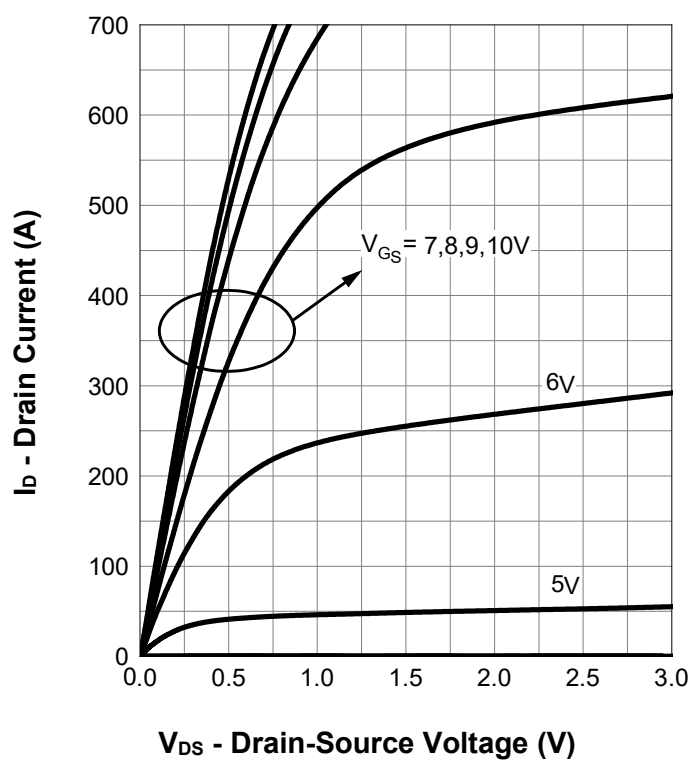


Transient Thermal Impedance

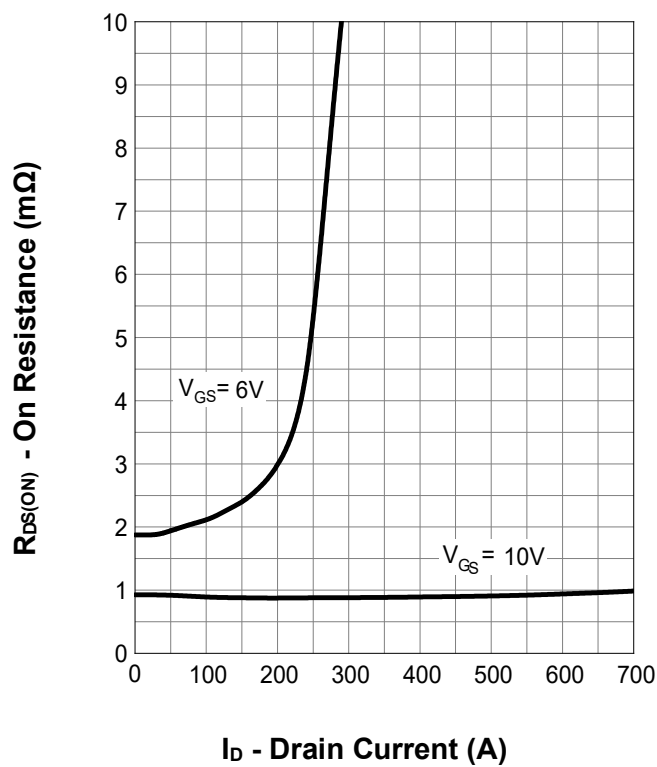


7. Typical Characteristics (cont.)

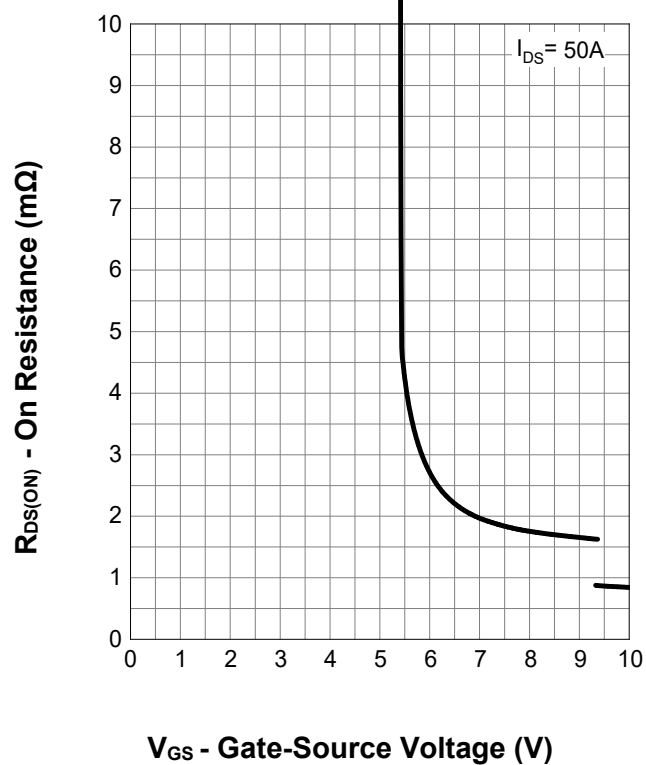
Output Characteristics



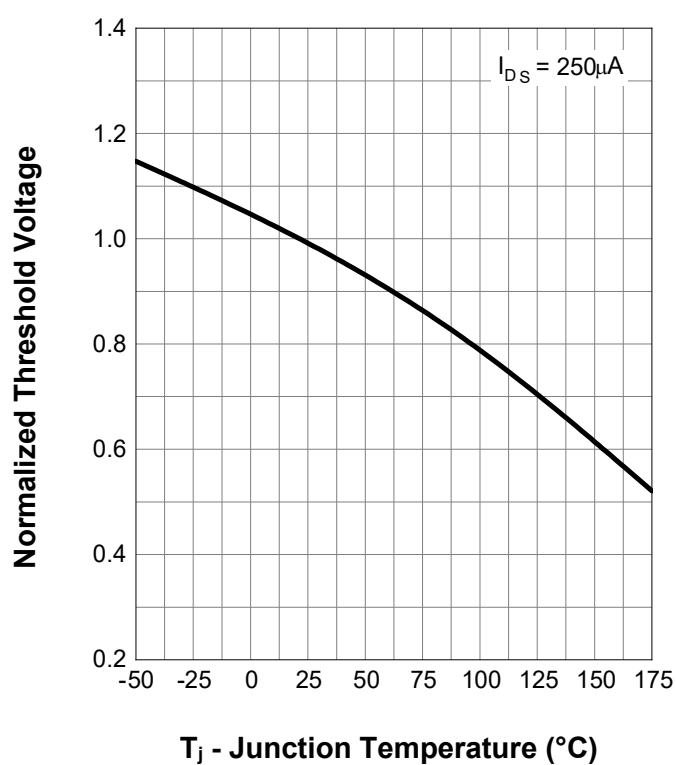
On Resistance



Transfer Characteristics

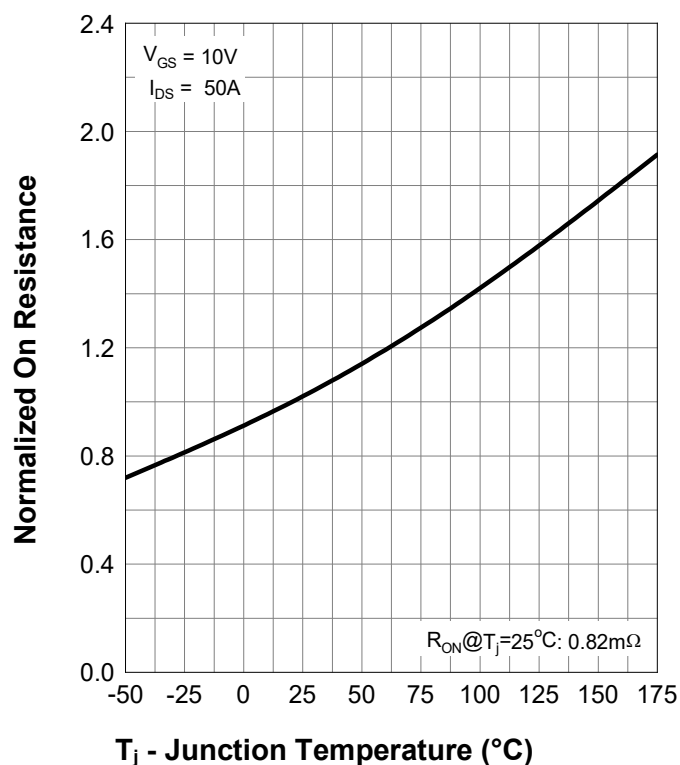


Normalized Threshold Voltage

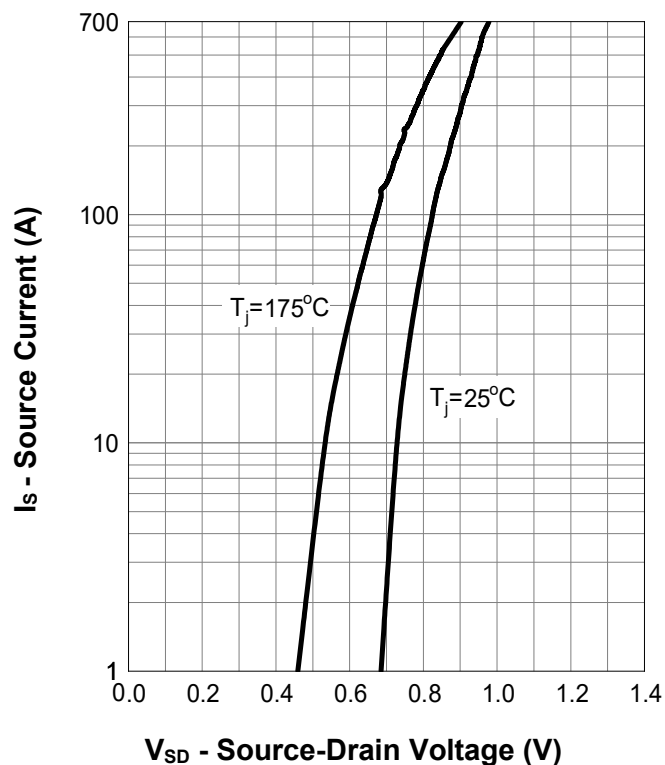


7. Typical Characteristics (cont.)

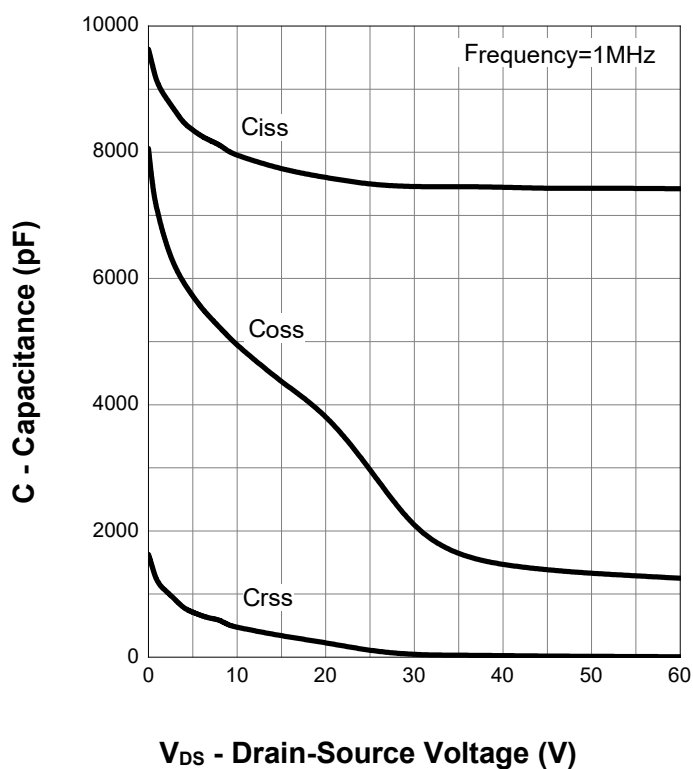
Normalized On Resistance



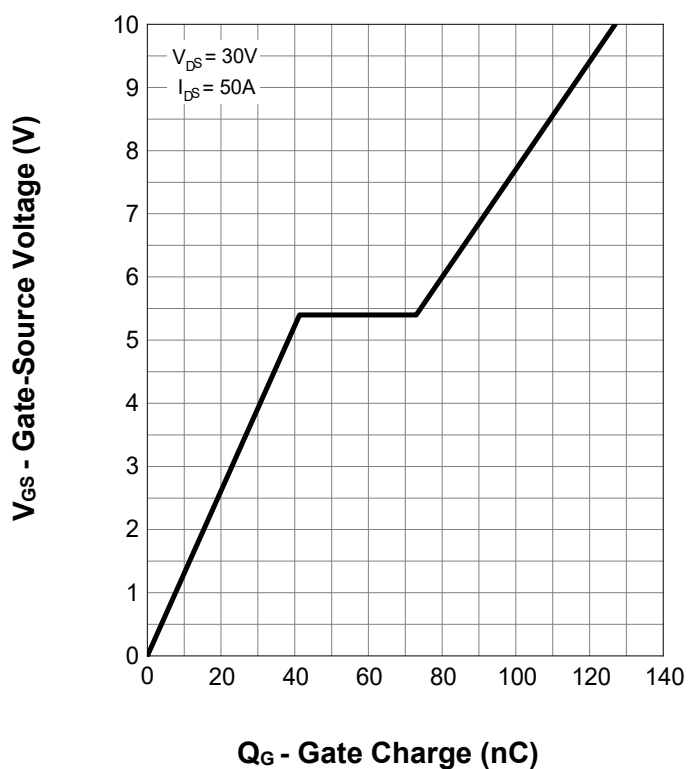
Diode Forward Current



Capacitance

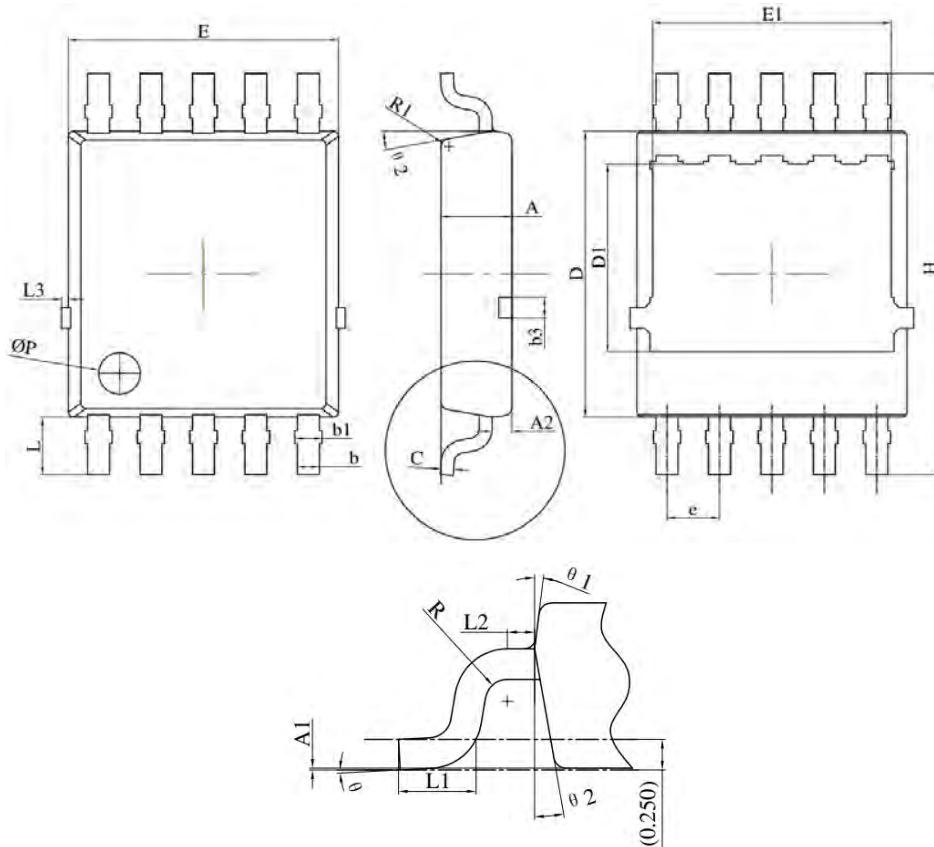


Gate Charge



8. Package Dimensions

SSO10T Package



Symbol	Dimensions In Millimeters		
	MIN	NOR	MAX
A	1.250	1.350	1.450
A1	0.000	0.015	0.100
A2	0.275	0.375	0.475
b	0.320	0.420	0.520
b1	0.370	0.520	0.670
c	0.200	0.250	0.300
D	5.330	5.480	5.630
D1	3.450	3.600	3.750
E	5.050	5.150	5.250
E1	4.300	4.550	4.800
e	1.000bsc		
H	7.480	7.680	7.880
L	0.950	1.100	1.250

Symbol	Dimensions In Millimeters		
	MIN	NOR	MAX
L1	0.500	0.650	0.800
L2	0.160	0.260	0.360
L3	0	-	0.150
P	0.650	0.800	0.950
R	0.100	0.180	0.280
R1	0.100	0.150	0.250
θ	0°	2°	6°
θ 1	5°	7°	9°
θ 2	8°	10°	12°