

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

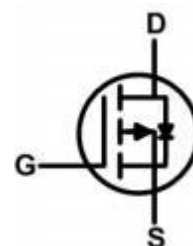
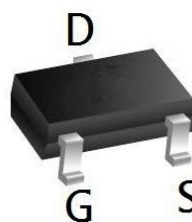
Product Summary

BVDSS	RDSON	ID
-20V	13mΩ	-9A

Description

The UD20P09L is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The UD20P09L meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

SOT23-3L Pin Configuration



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	-9	A
	$T_A = 100^\circ\text{C}$		-4	
Pulsed Drain Current ¹		I_{DM}	-66	A
Single Pulse Avalanche Energy ²		EAS	28.8	mJ
Total Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	30	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	$R_{\theta JA}$	41.6	$^\circ\text{C/W}$

Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-20	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±12V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J = 25°C	I _{DSS}	V _{DS} = -20V, V _{GS} = 0V	-	-	-1	μA
	T _J = 100°C			-	-	-100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-0.4	-0.65	-1	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = -4.5V, I _D = -8A	-	13.0	18	mΩ
			V _{GS} = -2.5V, I _D = -6A	-	17	23	
Forward Transconductance ⁴		g _{fs}	V _{DS} = -4.5V, I _D = -8A	-	36	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = -10V, V _{GS} = 0V, f = 1MHz	-	1630	-	pF
Output Capacitance		C _{oss}		-	211	-	
Reverse Transfer Capacitance		C _{rss}		-	187	-	
Gate Resistance		R _g	f = 1MHz	-	10	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = -4.5V, V _{DS} = -10V, I _D = -8A	-	12	-	nC
Gate-Source Charge		Q _{gs}		-	1.8	-	
Gate-Drain Charge		Q _{gd}		-	3.2	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} = -4.5V, V _{DD} = -10V, R _G = 3Ω, I _D = -8A	-	17	-	ns
Rise Time		t _r		-	25.5	-	
Turn-Off Delay Time		t _{d(off)}		-	32	-	
Fall Time		t _f		-	15	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = -8A, V _{GS} = 0V	-	-	-1.2	V
Continuous Source Current	T _A = 25°C	I _S	-	-	-	-40	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L = 0.1\text{mH}, I_{AS} = -24A$
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Characteristics

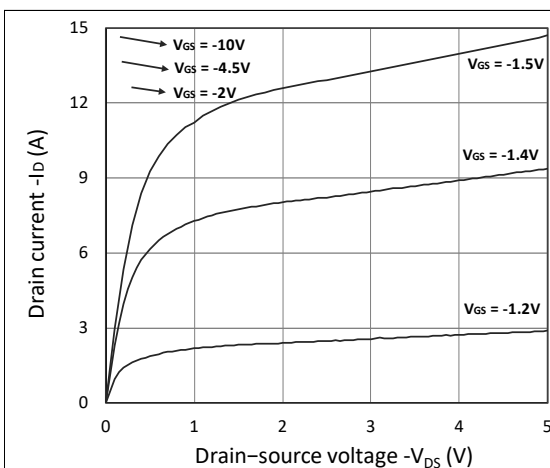


Figure 1. Output Characteristics

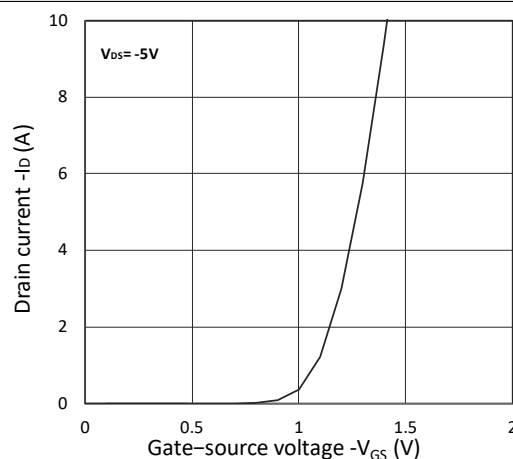


Figure 2. Transfer Characteristics

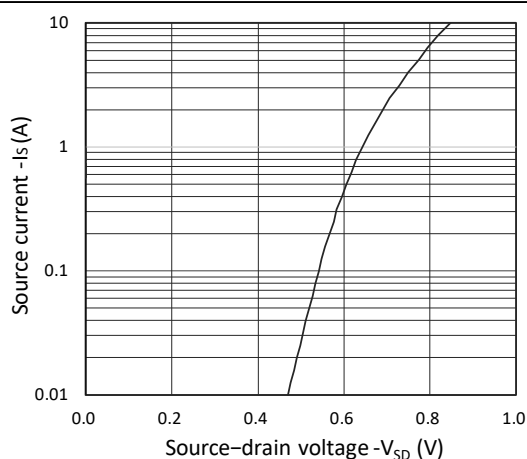


Figure 3. Forward Characteristics of Reverse

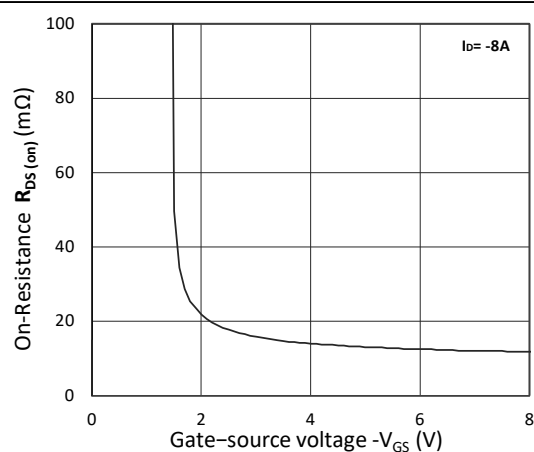


Figure 4. $R_{DS(on)}$ vs. V_{GS}

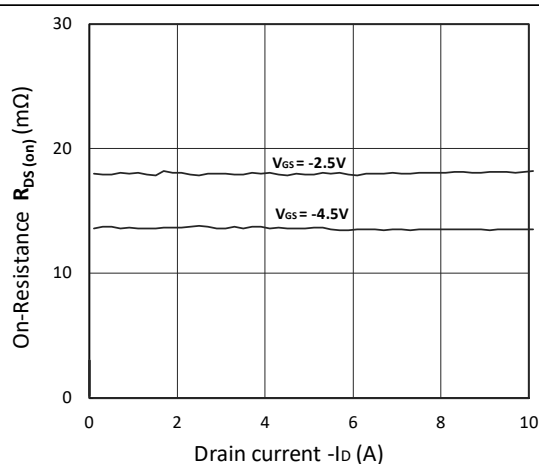


Figure 5. $R_{DS(on)}$ vs. I_D

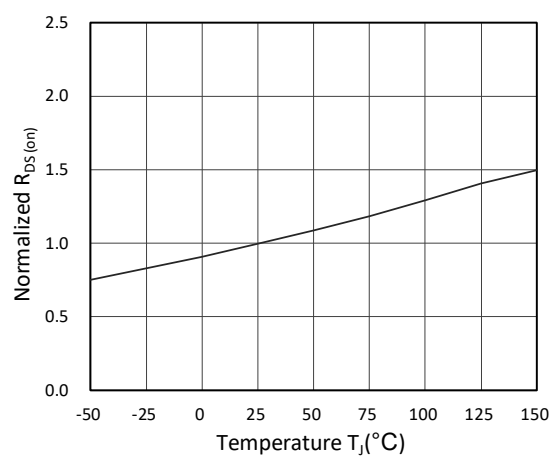


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

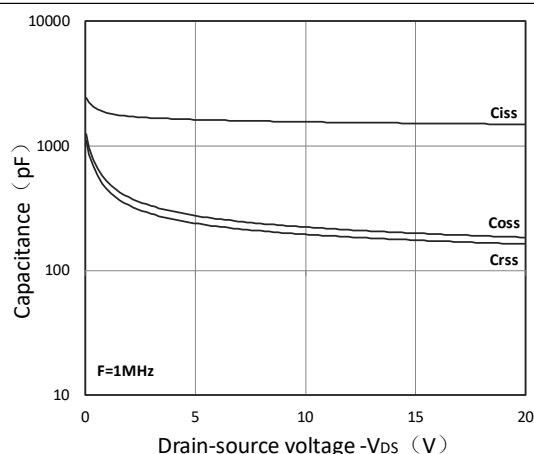


Figure 7. Capacitance Characteristics

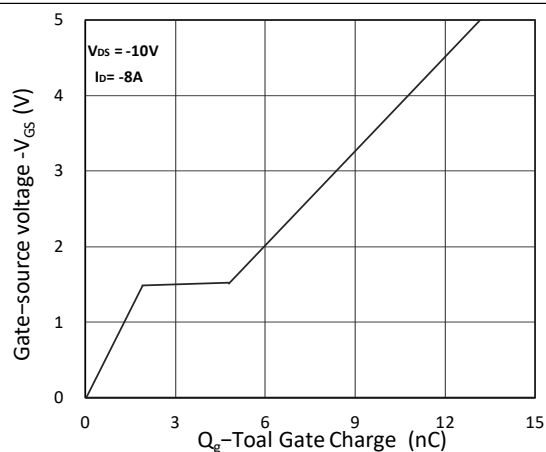


Figure 8. Gate Charge Characteristics

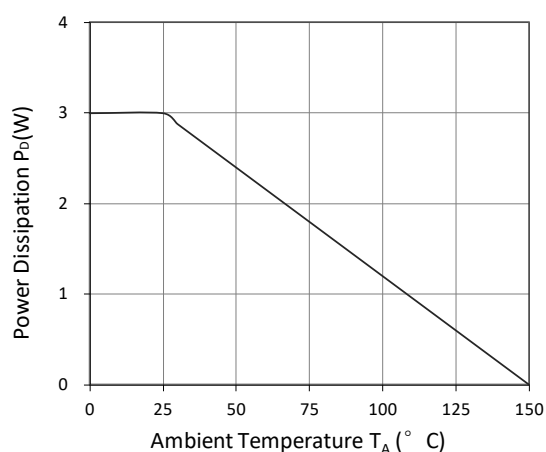


Figure 9. Power Dissipation

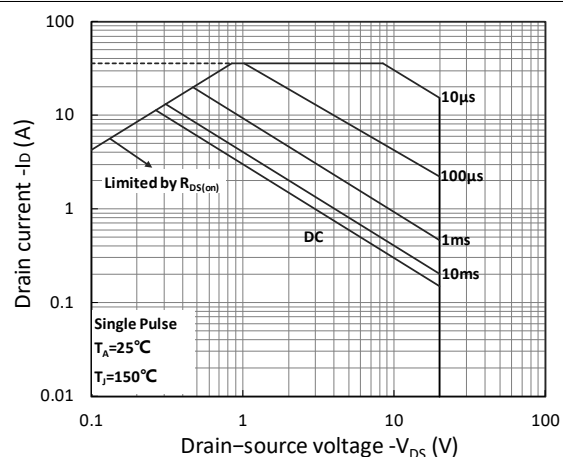


Figure 10. Safe Operating Area

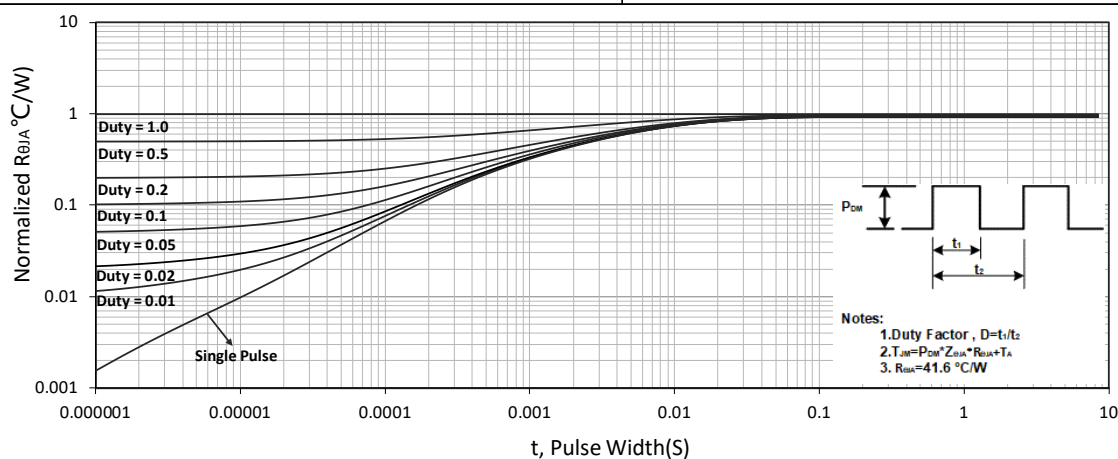
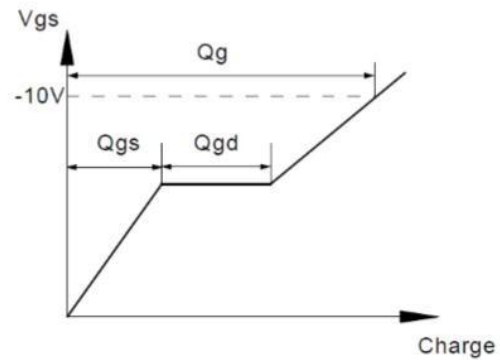
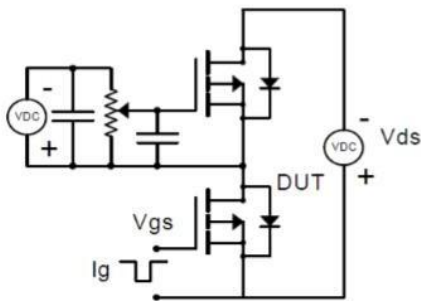


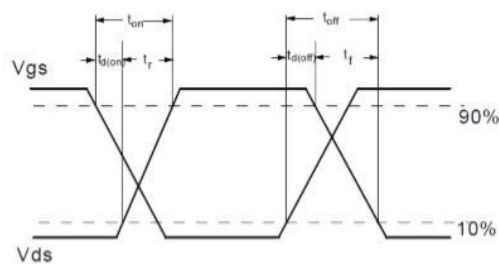
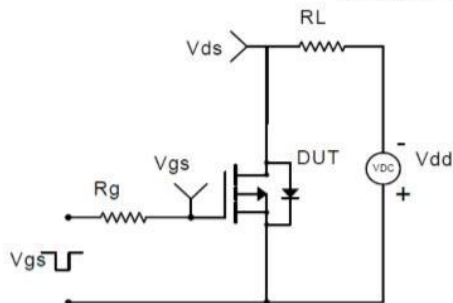
Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

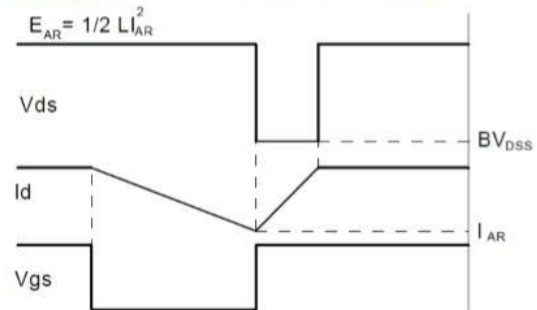
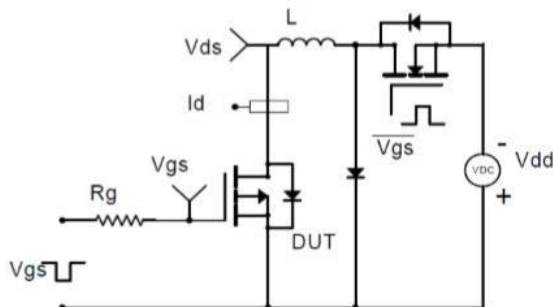
Gate Charge Test Circuit & Waveform



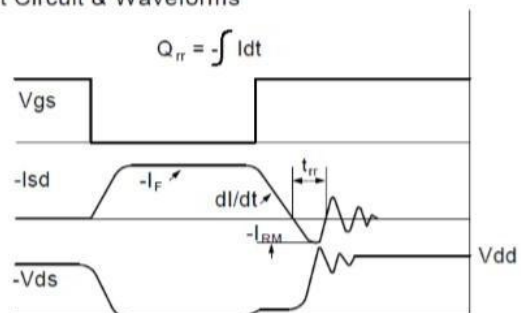
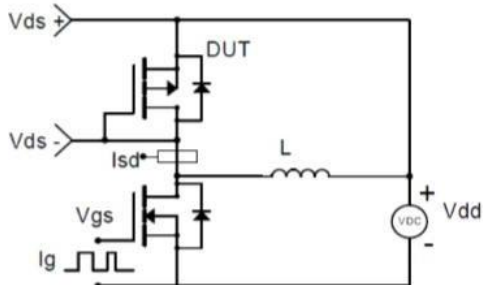
Resistive Switching Test Circuit & Waveforms



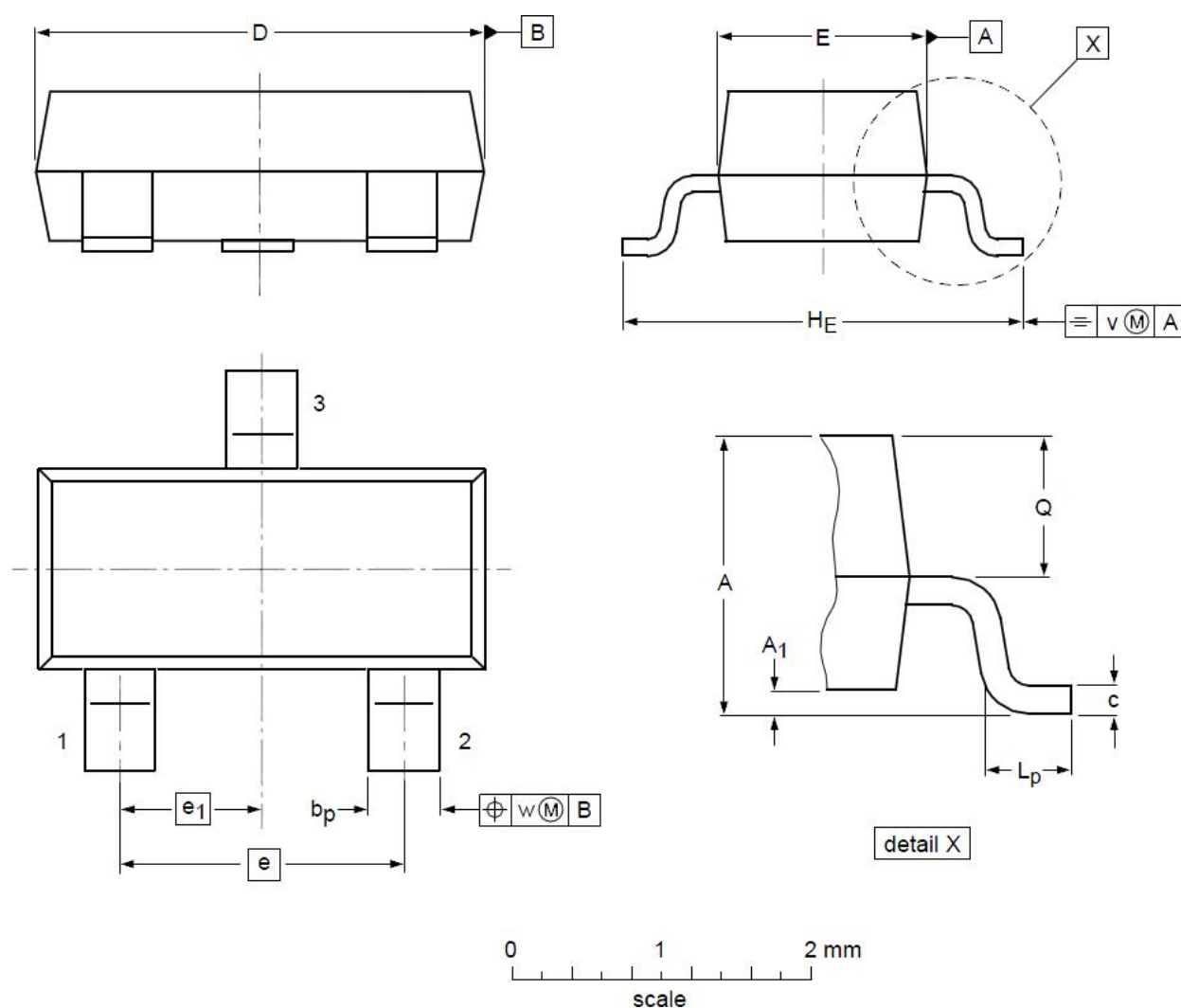
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°