

P-Ch 20V Fast Switching MOSFETs

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

Product Summary



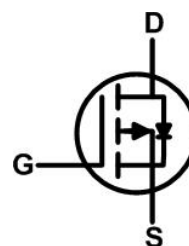
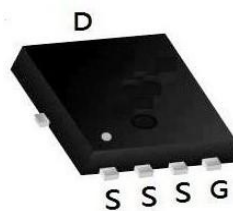
BVDSS	RDS(on)	ID
-20V	6mΩ	-60A

Description

The UD60P02D is the high cell density trench P-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The UD60P02D meet the RoHS and Green Product requirement with full function reliability approved.

PDFN3333-8L Pin Configuration



Absolute Maximum Ratings (T_A = 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V _{DS}	-20	V
Gate-Source Voltage		V _{GS}	±10	V
Continuous Drain Current	T _C =25°C	I _D	-60	A
	T _C =100°C		-34.8	
Pulsed Drain Current ¹		I _{DM}	-220	A
Single Pulse Avalanche Energy ²		EAS	61.25	mJ
Total Power Dissipation	T _C =25°C	P _D	39	W
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	R _{θJA}	38	°C/W
Thermal Resistance from Junction-to-Case	R _{θJC}	3.2	°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		$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20	-	-	V
Gate-body Leakage current		I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 10V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J=25^{\circ}C$	I_{DSS}	$V_{DS} = -20V, V_{GS} = 0V$	-	-	-1	μA
	$T_J=100^{\circ}C$			-	-	-100	
Gate-Threshold Voltage		$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-	-1.0	V
Drain-Source on-Resistance ⁴		$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -15A$	-	6	8.2	mΩ
			$V_{GS} = -2.5V, I_D = -10A$	-	7.5	10	
			$V_{GS} = -1.8V, I_D = -8A$	-	10.2	15	
Forward Transconductance ⁴		g_{fs}	$V_{DS} = -5V, I_D = -15A$	-	78	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C_{iss}	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$	-	3560	-	pF
Output Capacitance		C_{oss}		-	500	-	
Reverse Transfer Capacitance		C_{rss}		-	430	-	
Gate Resistance		R_g	$f = 1MHz$	-	11	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q_g	$V_{GS} = -4.5V, V_{DS} = -10V, I_D = -15A$	-	43	-	nC
Gate-Source Charge		Q_{gs}		-	7.9	-	
Gate-Drain Charge		Q_{gd}		-	11.2	-	
Turn-on Delay Time		$t_{d(on)}$	$V_{GS} = -4.5V, V_{DD} = -10V, R_G = 3\Omega, I_D = -15A,$	-	14.5	-	ns
Rise Time		t_r		-	20.2	-	
Turn-off Delay Time		$t_{d(off)}$		-	93	-	
Fall Time		t_f		-	161	-	
Body Diode Reverse Recovery Time		t_{rr}	$I_F = -15A, dI_F/dt = 100A/\mu s$	-	28	-	ns
Body Diode Reverse Recovery Charge		Q_{rr}		-	25.7	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V_{SD}	$I_S = -1A, V_{GS} = 0V$	-	-	-1.2	V
Continuous Source Current	$T_C=25^{\circ}C$	I_S	-	-	-	-60	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 $V_{DD} = -25V, V_{GS} = -10V, L = 0.1\text{mH}, I_{AS} = 35A$.
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

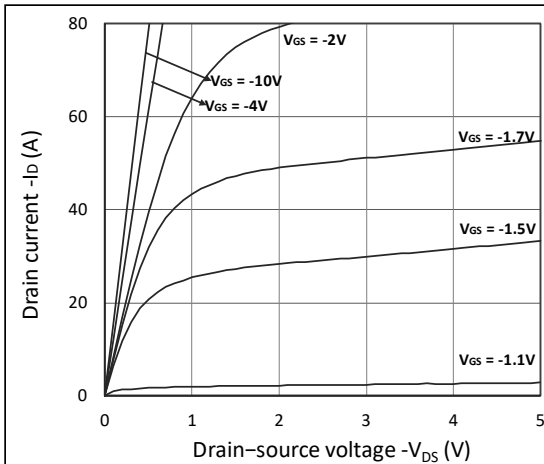


Figure 1. Output Characteristics

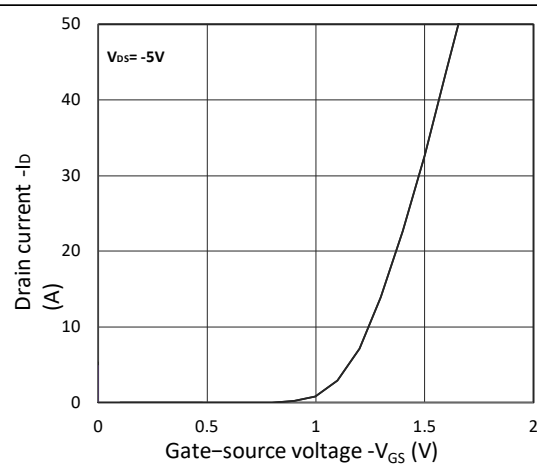


Figure 2. Transfer Characteristics

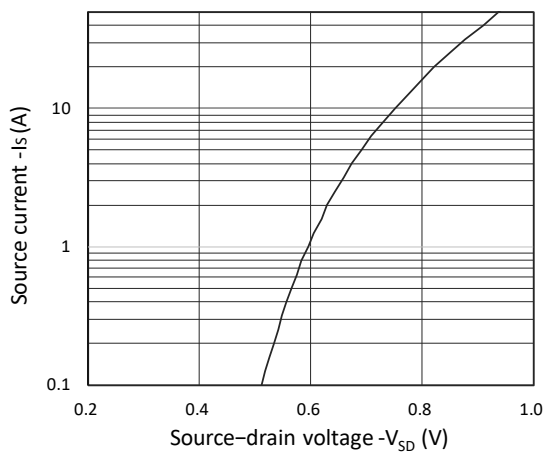


Figure 3. Forward Characteristics of Reverse

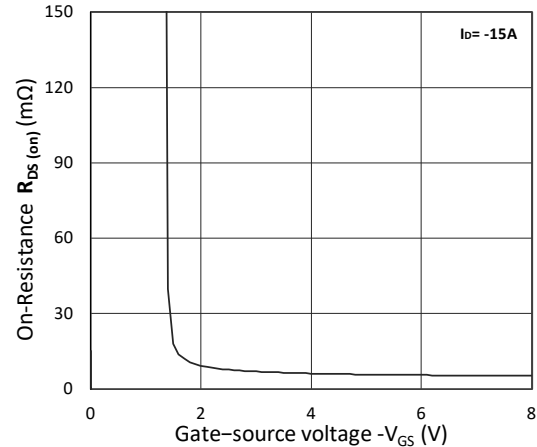


Figure 4. $R_{DS(on)}$ vs. V_{GS}

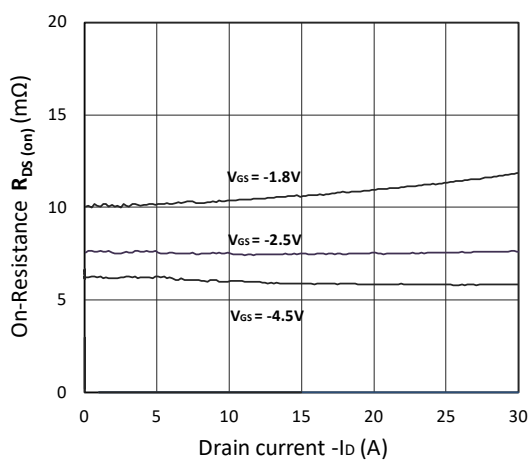


Figure 5. $R_{DS(on)}$ vs. I_D

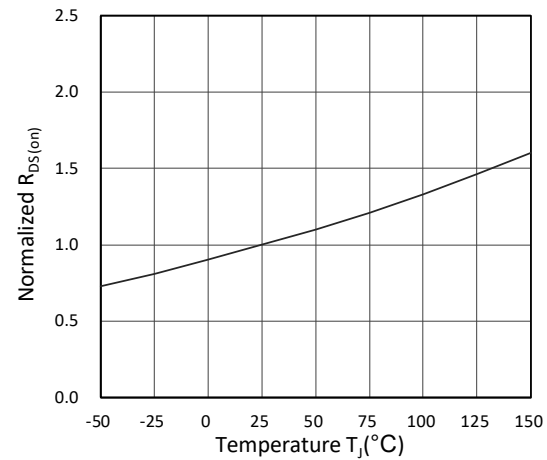


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

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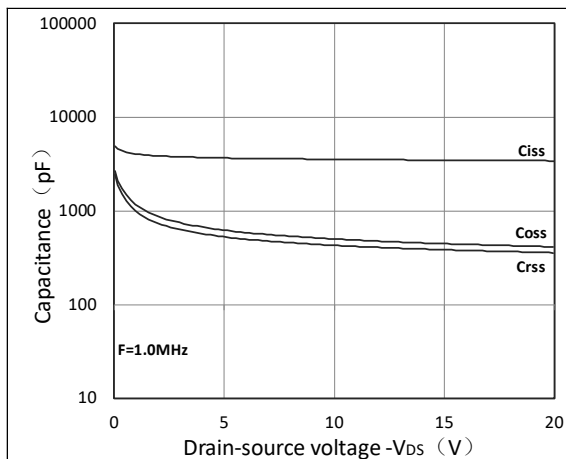


Figure 7. Capacitance Characteristics

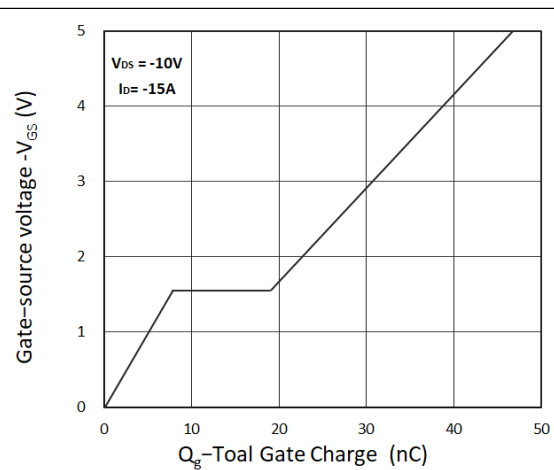


Figure 8. Gate Charge Characteristics

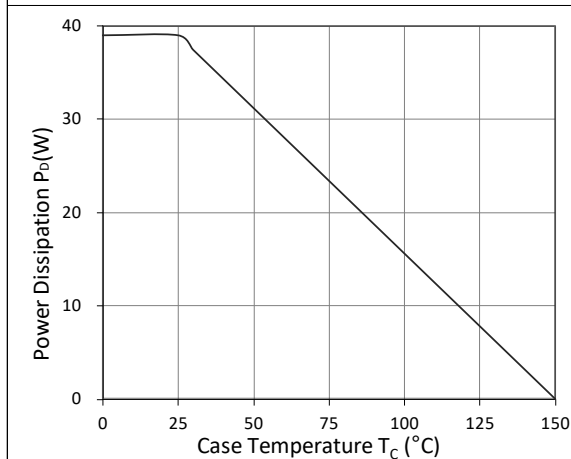


Figure 9. Power Dissipation

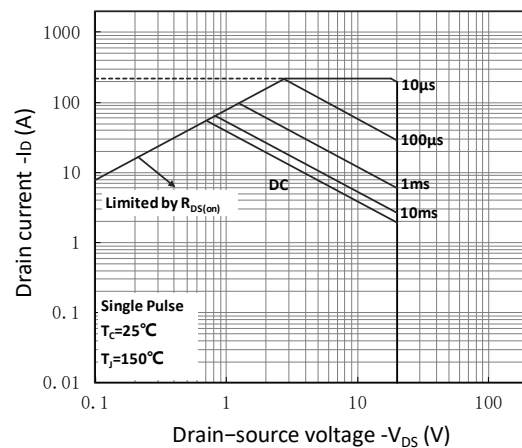


Figure 10. Safe Operating Area

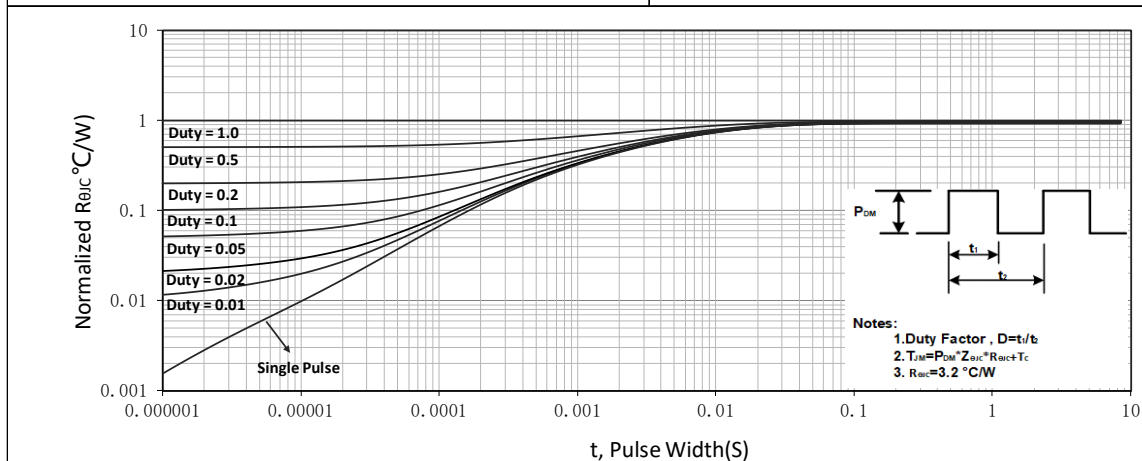


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

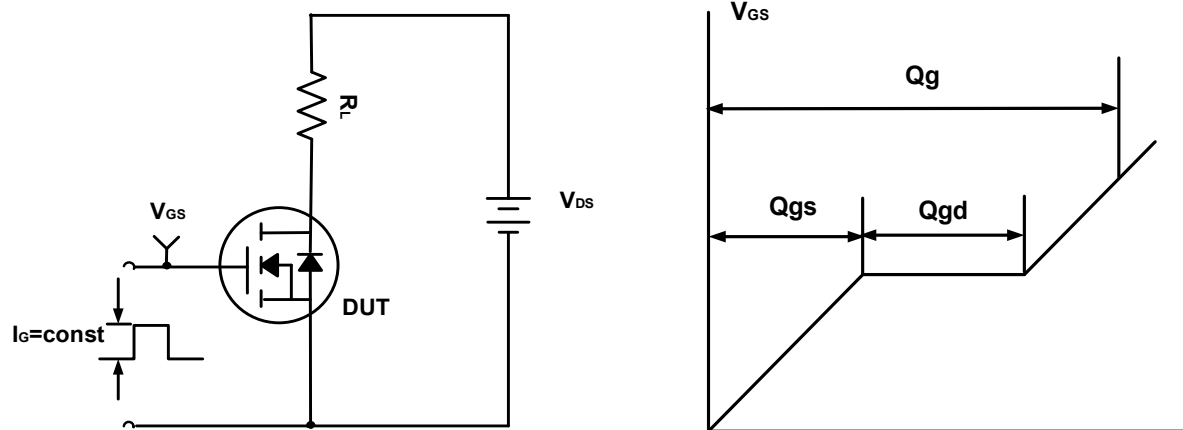


Figure A. Gate Charge Test Circuit & Waveforms

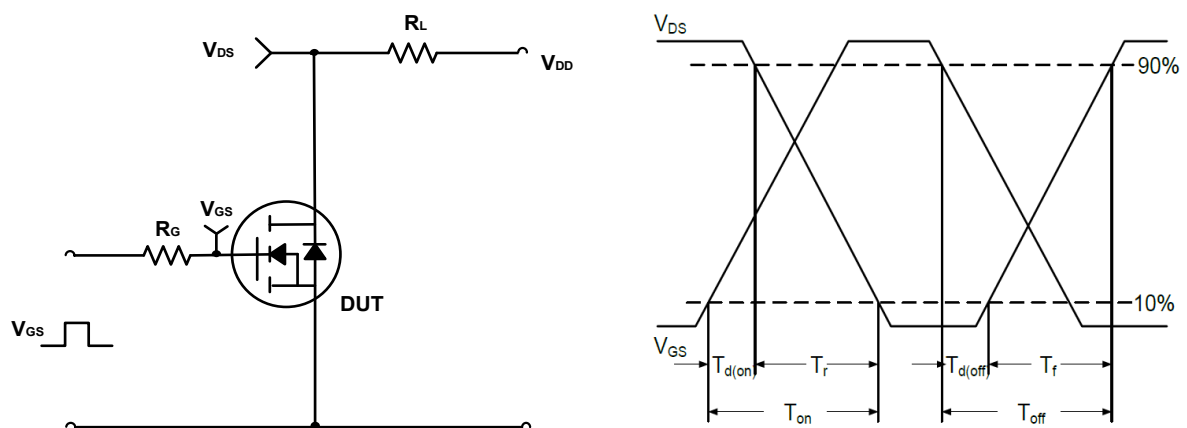


Figure B. Switching Test Circuit & Waveforms

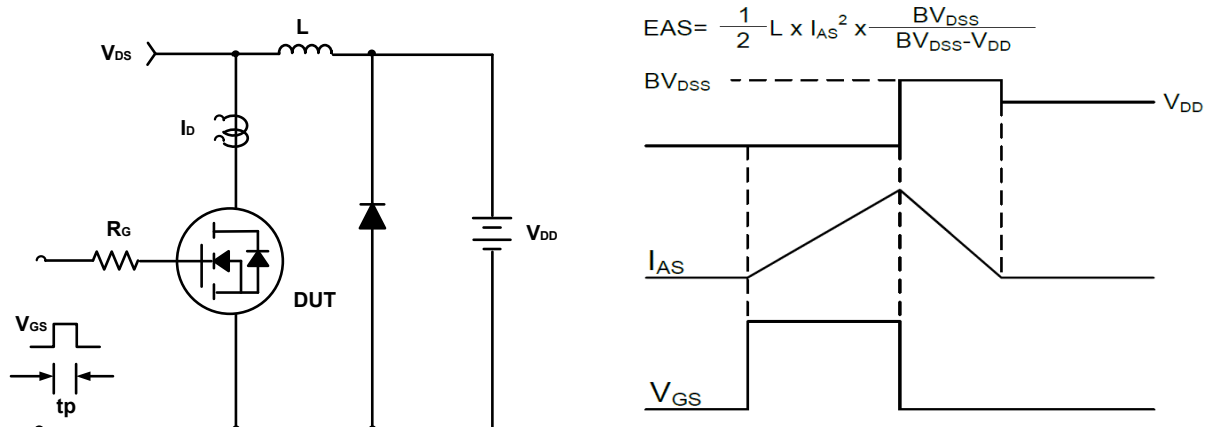
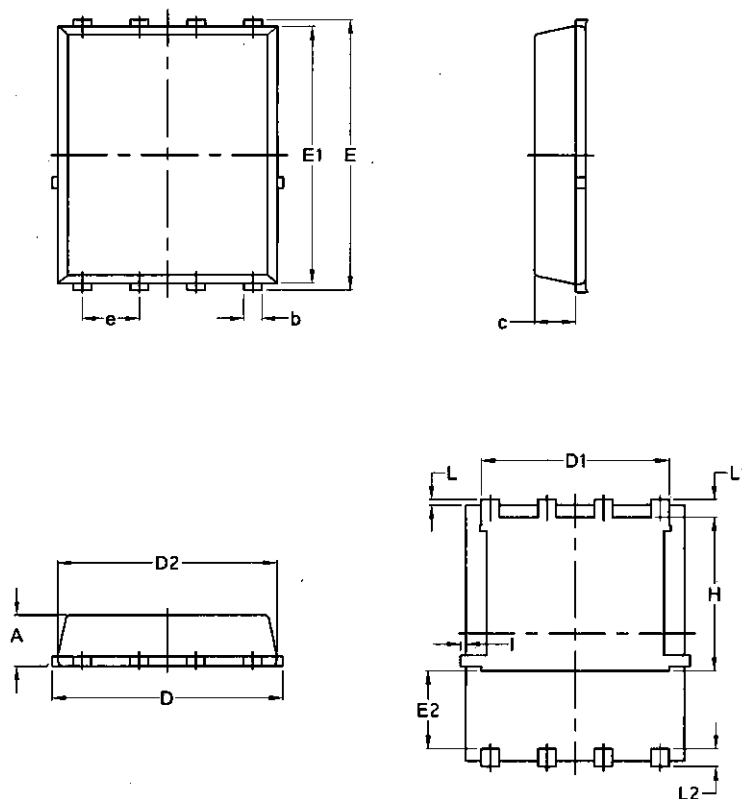


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Mechanical Data-PDFN3333-8L-Single



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.80	0.90
A1	0.00	0.03	0.05
b	0.24	0.30	0.35
c	0.10	0.15	0.20
D	3.25	3.32	3.40
D1	3.05	3.15	3.25
D2	2.40	2.50	2.60
E	3.00	3.10	3.20
E1	1.35	1.45	1.55
e	0.65 BSC.		
H	3.20	3.30	3.40
L	0.30	0.40	0.50
L1	0.10	0.15	0.20
L2	1.13 REF.		