

N-Ch and P-Ch Fast Switching MOSFETs

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

Description

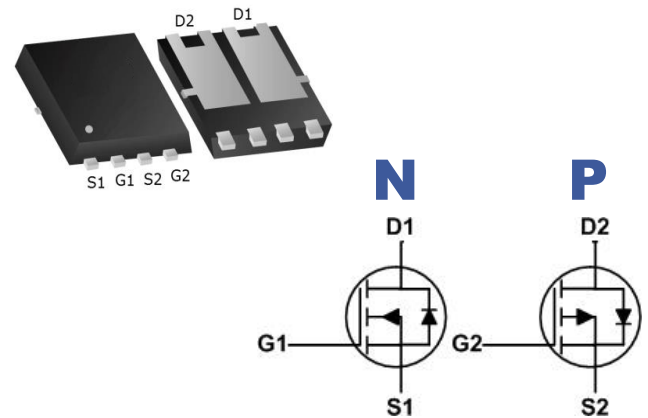
The UD30G30D is th high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The UD30G30D meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Product Summary



BVDSS	RDSON	ID
30V	9.5mΩ	20A
-30V	16 mΩ	-20A

PDFN3333-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D@Ta=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	-20	A
$I_D@Ta=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	10	-10	A
I_{DM}	Pulsed Drain Current ²	72	-48	A
EAS	Single Pulse Avalanche Energy ³	48	66	mJ
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	15	15.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^{\circ}C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	48	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	5	$^{\circ}C/W$

N-Ch and P-Ch Fast Switching MOSFETs

N-Channel Electrical Characteristics $T = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =10A	-	9.5	13	mΩ
		V _{GS} =4.5V, I _D =5A	-	16	22.5	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz	-	633	-	pF
C _{oss}	Output Capacitance		-	120	-	pF
C _{rss}	Reverse Transfer Capacitance		-	99	-	pF
Q _g	Total Gate Charge	V _{DS} =15V, I _D =10A, V _{GS} =10V	-	15	-	nC
Q _{gs}	Gate-Source Charge		-	4.7	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	3.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =30V,I _D =18A, R _{GEN} =3Ω, V _{GS} =10V	-	5	-	ns
t _r	Turn-on Rise Time		-	8	-	ns
t _{d(off)}	Turn-off Delay Time		-	21	-	ns
t _f	Turn-off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _s	Maximum Continuous Drain to Source Diode Forward Current		-	-	20	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	72	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =18A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A,dI/dt=100A/μs	-	7	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	5.9	-	nC

Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=20A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Ch and P-Ch Fast Switching MOSFETs

P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -10A	-	16	25	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	29	40	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} =0V, f=1.0MHz	-	1240	-	pF
C _{oss}	Output Capacitance		-	151	-	pF
C _{rss}	Reverse Transfer Capacitance		-	138	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -6A, V _{GS} = -10V	-	24	-	nC
Q _{gs}	Gate-Source Charge		-	3.7	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.8	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -15V, I _D = -10A, V _{GS} = -10V, R _{GEN} =3Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	5.5	-	ns
t _{d(off)}	Turn-off Delay Time		-	3.5	-	ns
t _f	Turn-off Fall Time		-	4.6	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-20	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-48	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -10A	-	-	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=-15V$, $V_G=-10V$, $R_G=25\Omega$, $L=0.1mH$, $I_{AS}=-27A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics-N

Figure1: Output Characteristics

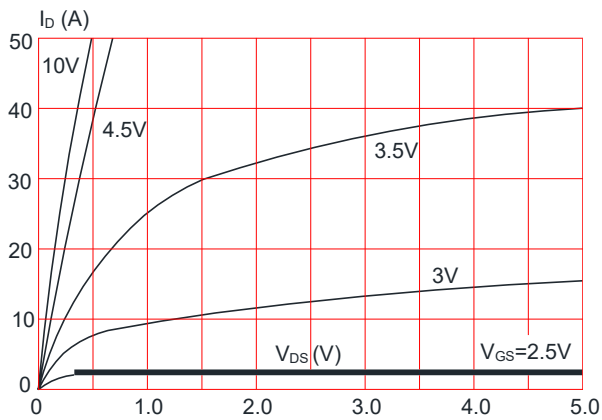


Figure 2: Typical Transfer Characteristics

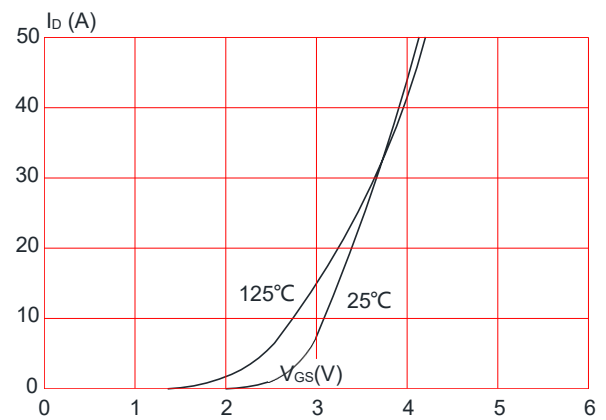


Figure 3: On-resistance vs. Drain Current

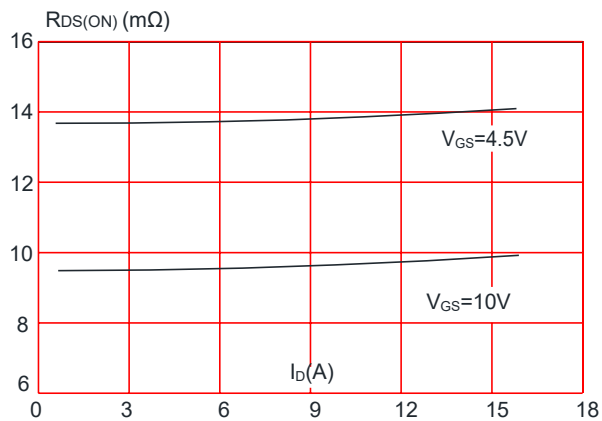


Figure 4: Body Diode Characteristics

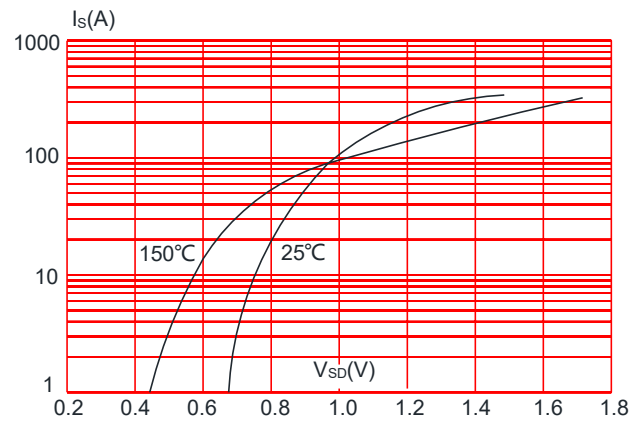


Figure 5: Gate Charge Characteristics

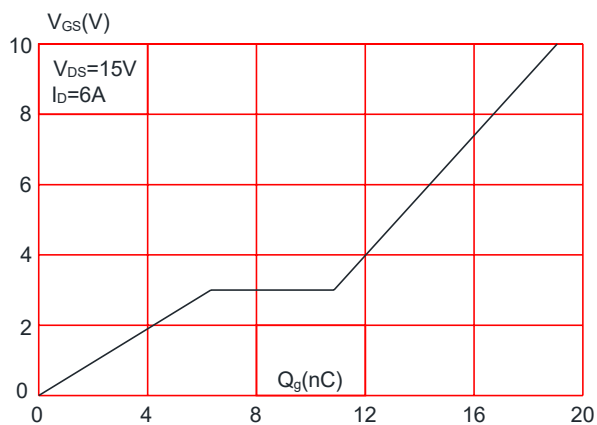
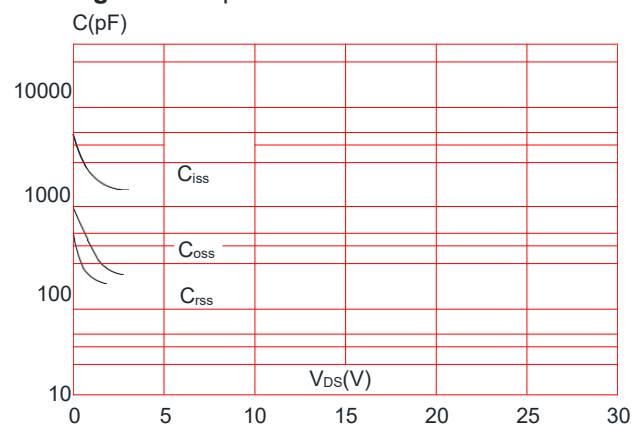


Figure 6: Capacitance Characteristics



N-Ch and P-Ch Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

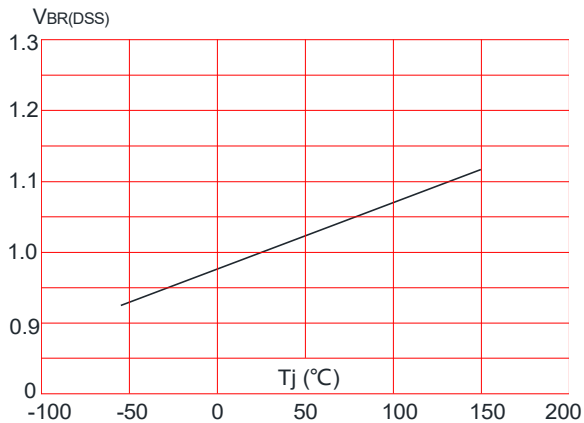


Figure 8: Normalized on Resistance vs. Junction Temperature

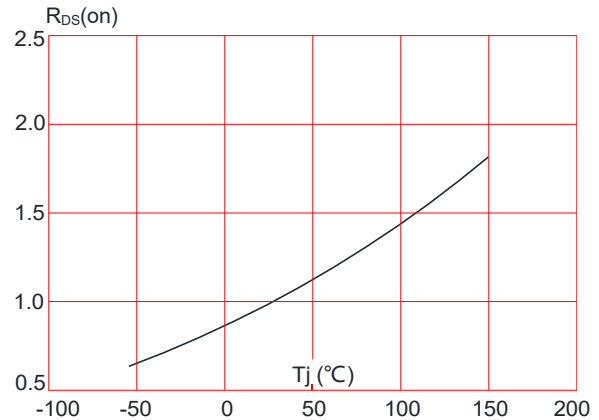


Figure 9: Maximum Safe Operating Area

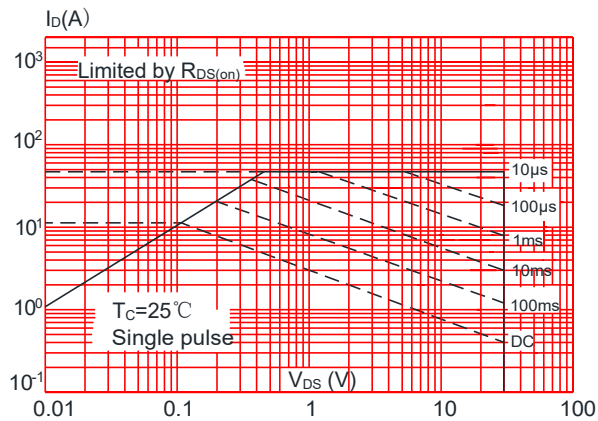


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

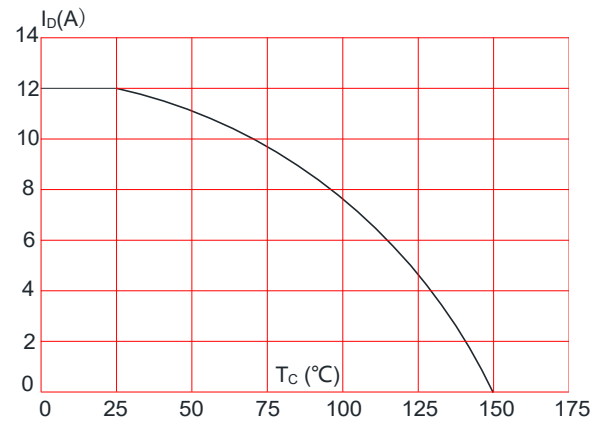
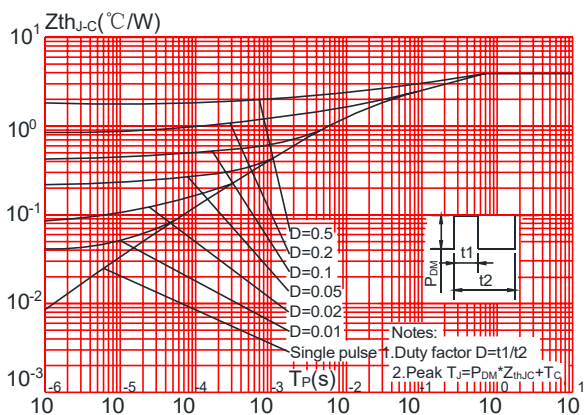


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit-N

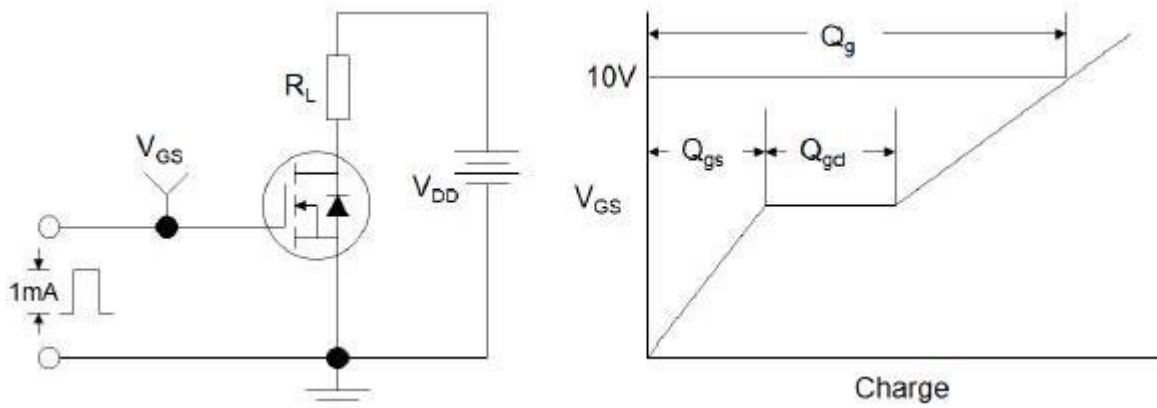


Figure1:Gate Charge Test Circuit & Waveform

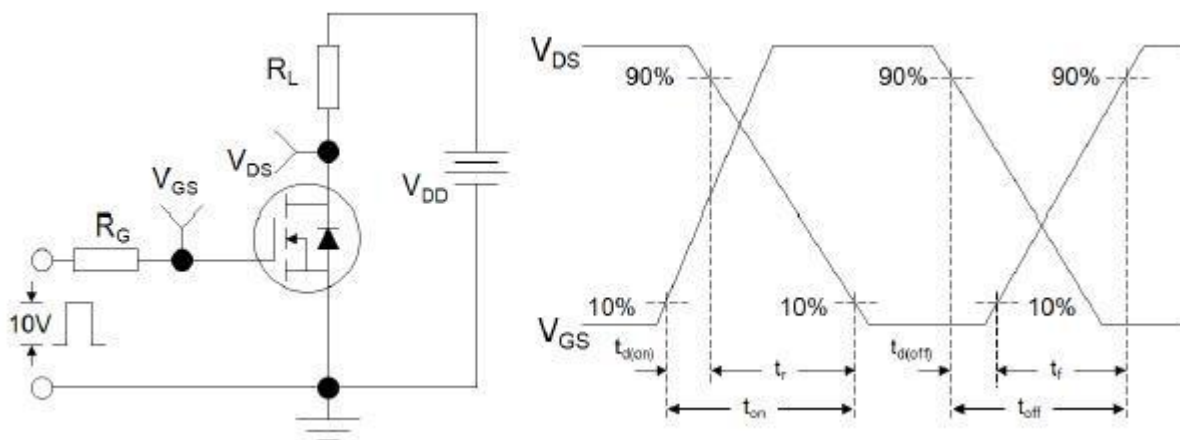


Figure 2: Resistive Switching Test Circuit & Waveforms

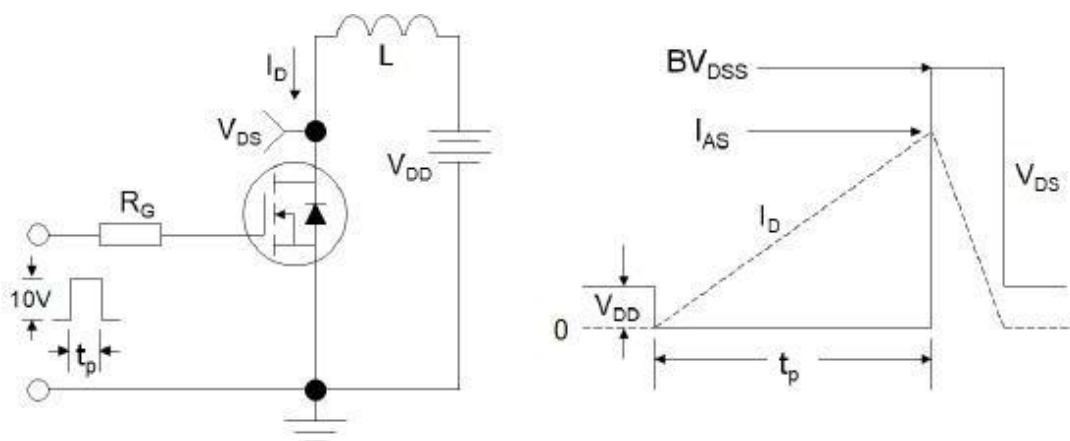


Figure 3:Unclamped Inductive Switching Test Circuit & Wavefor

Typical Performance Characteristics-P

Figure 1: Output Characteristics

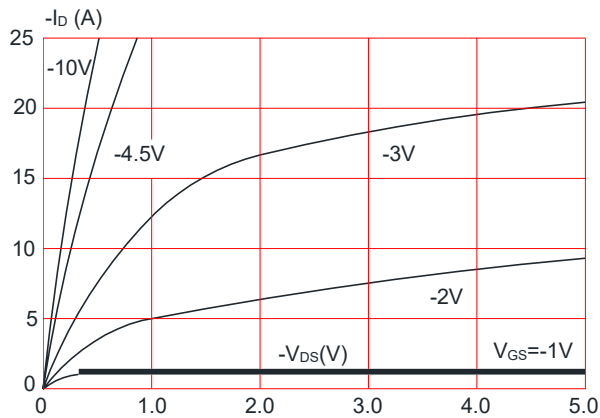


Figure 2: Typical Transfer Characteristics

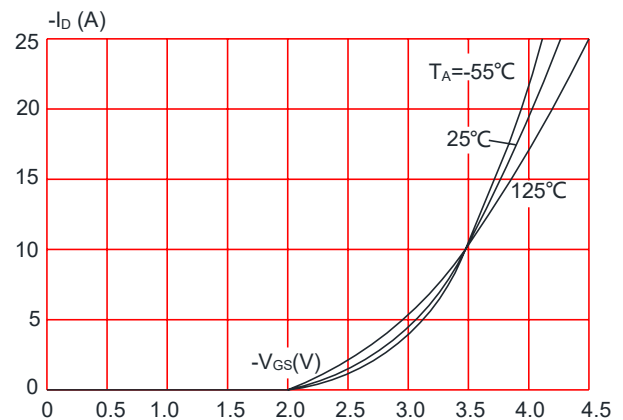


Figure 3: On-resistance vs. Drain Current

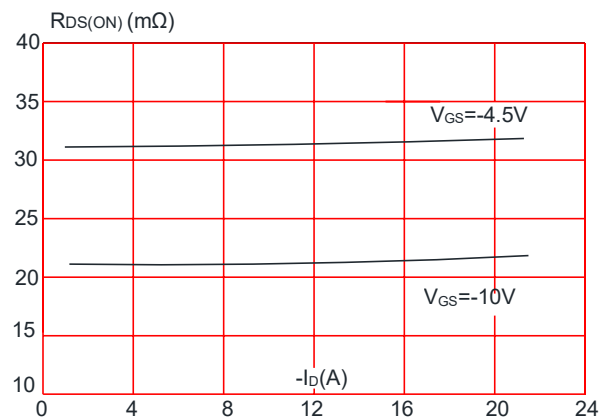


Figure 4: Body Diode Characteristics

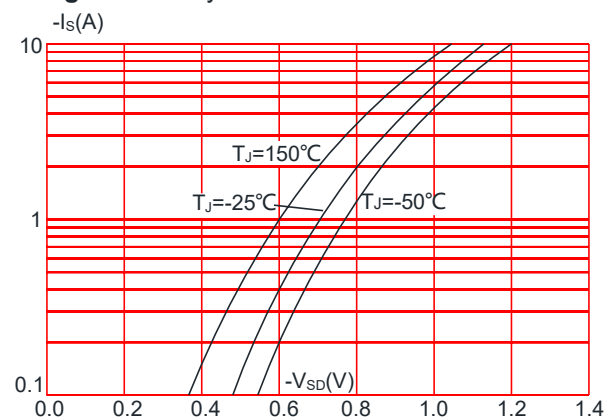


Figure 5: Gate Charge Characteristics

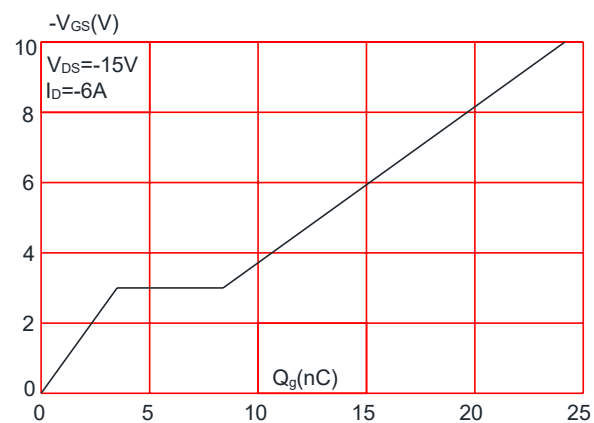
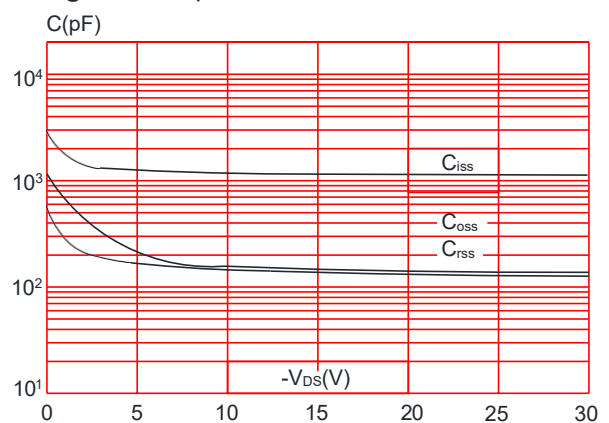


Figure 6: Capacitance Characteristics





N-Ch and P-Ch Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

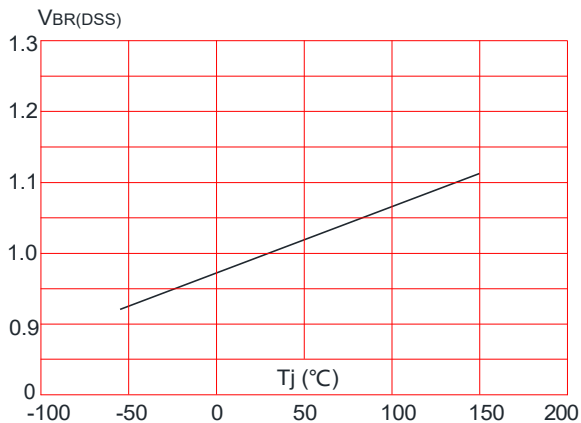


Figure 8: Normalized on Resistance vs. Junction Temperature

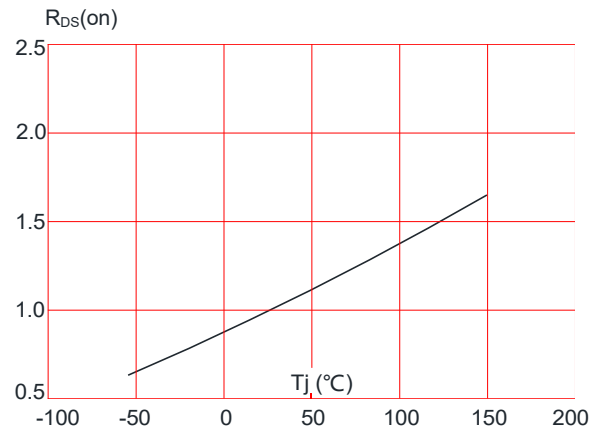


Figure 9: Maximum Safe Operating Area

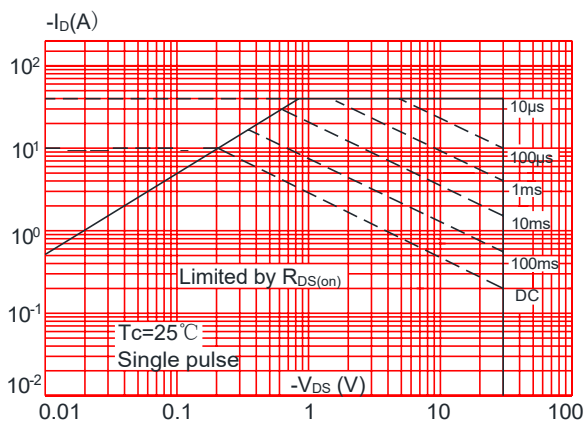


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

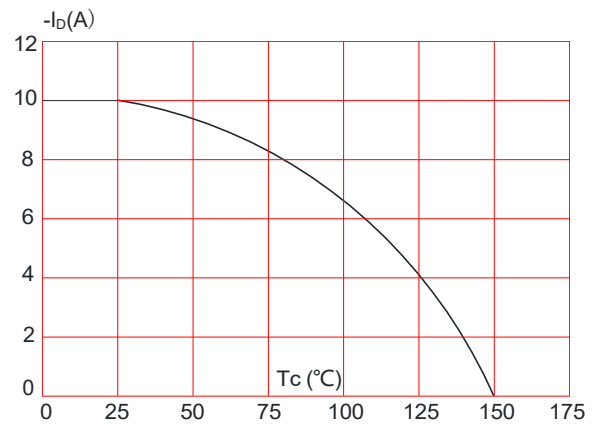
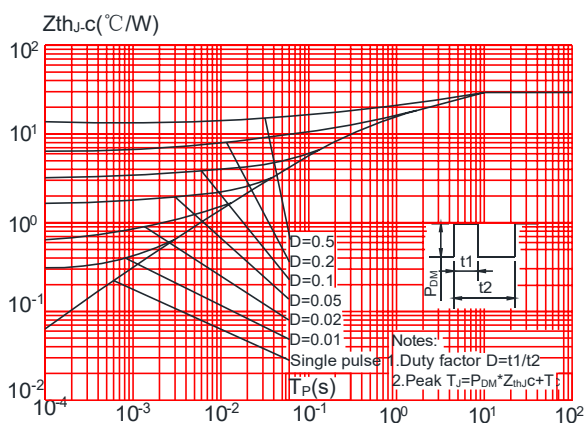


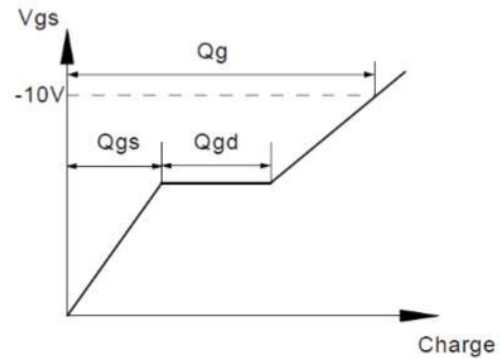
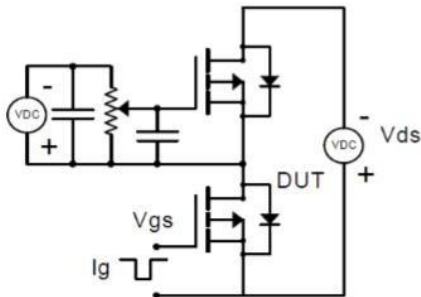
Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



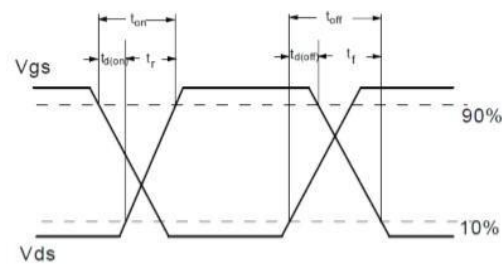
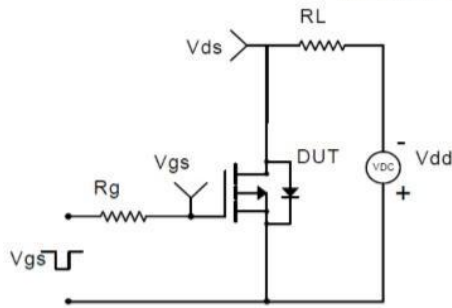


Test Circuit-P

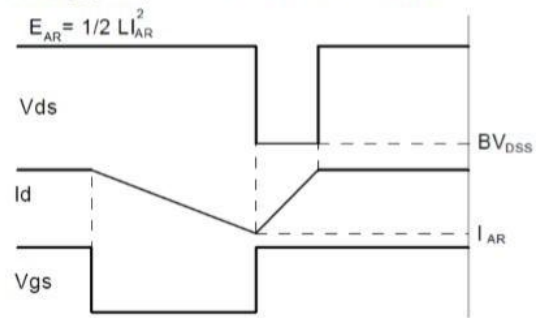
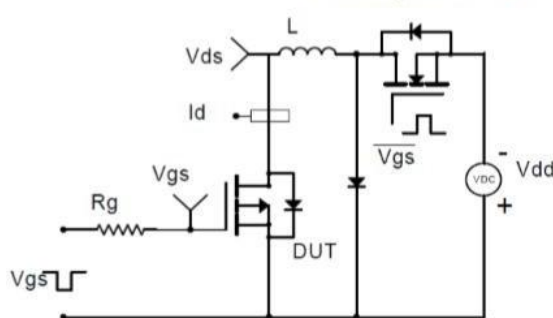
Gate Charge Test Circuit & Waveform



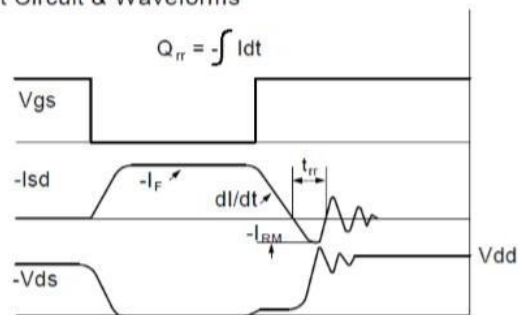
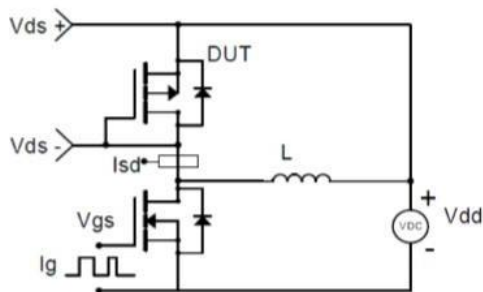
Resistive Switching Test Circuit & Waveforms



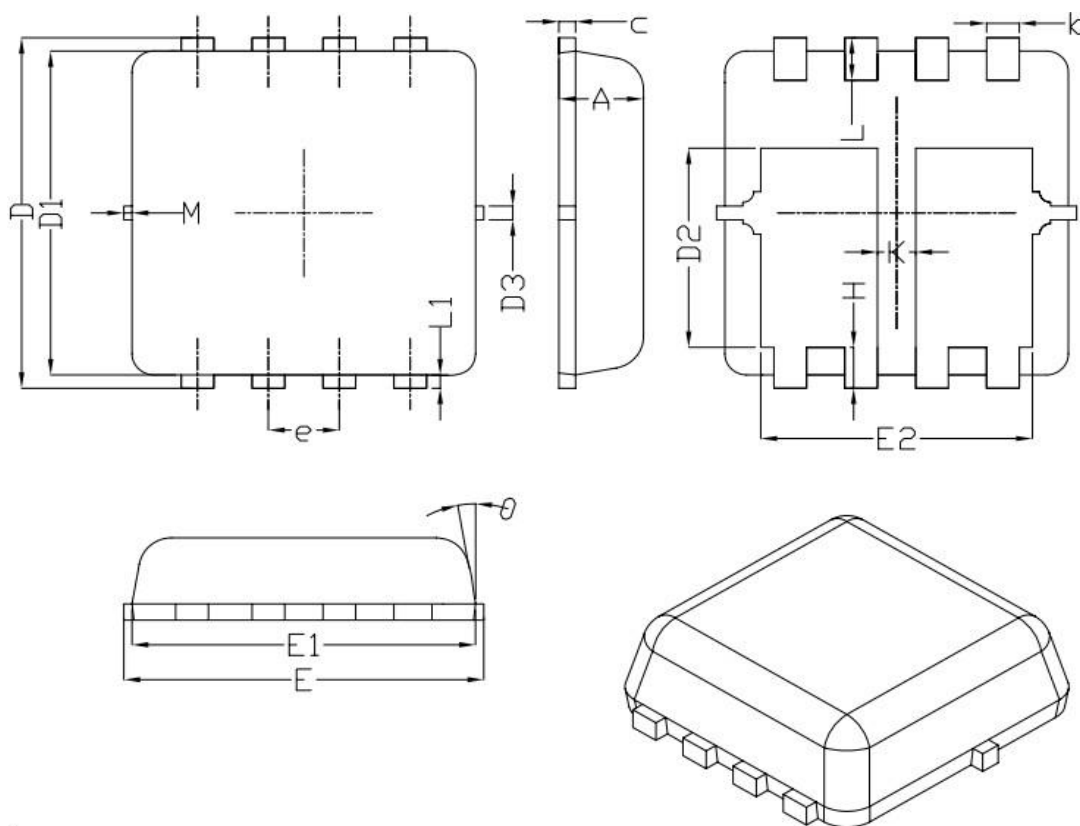
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Dual PDFN3333-8L Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	--	0.13	--
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65 BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	--	0.13	--
K	0.30	--	--
θ	--	10°	12°
M	*	*	0.15
* Not Specified			

Notes:

1. Refer to JEDEC MO-240 variation CA.
2. Dimensions "D1" and "E1" do NOT include mold flash protrusions or gate burrs.
3. Dimensions "D1" and "E1" include interterminal flash or protrusion.