■ Description

The U002N009D33 is the N-Channel enhancement mode MOSFET in a plastic package (DFN3*3) using the Trench technology. These features combine to make this design an extremely efficient and reliable device for variety of DC-DC applications.

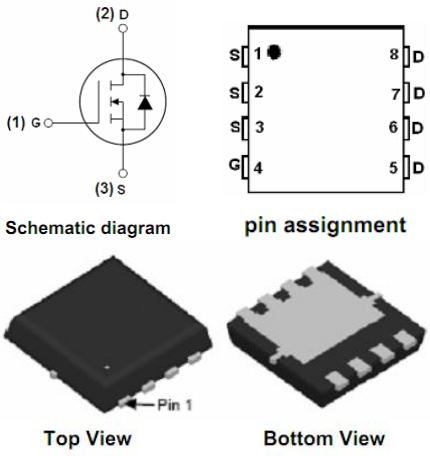
■ Features

- Trench Technology
- Fast Switching
- V_{DS} = 20V ; I_D = 10A
- Logic Level Compatible
- SMD Package (PDFN3*3)
- $R_{DS(ON)}$ typ.=11mΩ@ V_{GS} = 4.5V
- $R_{DS(ON)}$ typ.=13mΩ@ V_{GS} = 2.5 V

■ Applications

- High Speed Switch
- DC-DC Converters
- Lithium-Ion Battery
- Quick charge application

■ Package Information



Schematic diagram | pin assignment

Top View | Bottom View

■ Pin Configuration

Pin	Description	Symbol
1/2/3	Source	S
4	Gate	G
5/6/7/8	Drain	D

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

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±10	V
Continuous Drain Current (Tc =25°C)	I_D	10	A
Pulsed Drain Current	I_{DM}	32	A
Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance-Junction to Ambient **(Note 1)**	R_{thJA}	83	°C/W

■ Electrical Characteristics (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.45	0.62	1.0	V
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±10V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V			1	μA
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 4.5A		11	15	mΩ
		V_{GS} = 2.5V, I_D = 3A		13	18	
Forward Transconductance	g_{FS}	V_{DS} = 10V, I_D =5A	8.5			S
Diode Forward Voltage **(Note 2)**	V_{SD}	V_{GS} = 0V, I_S = 10A			0.6	V
Diode Forward Current **(Note 1)**	I_S				2	A
Dynamic						
Total Gate Charge	Q_g	V_{DS} = 10V, V_{GS} = 4.5V, I_D =5A		22		nC
Gate-Source Charge	Q_{gs}			3.2		
Gate-Drain Charge	Q_{gd}			4.5		
Input Capacitance	C_{iss}	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz		1260		pF
Output Capacitance	C_{oss}			300		
Reverse Transfer Capacitance	C_{rss}			120		
Switching						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D = 5A, V_{GS} = 4.5V, R_G = 6Ω R_L = 5Ω		30		nS
Rise Time	t_r			95		
Turn-Off Delay Time	$t_{d(off)}$			110		
Fall-Time	t_f			80		

Note: 1. Mounted on FR4 board, t ≤ 10sec.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

■ Typical Electrical and Thermal Characteristics

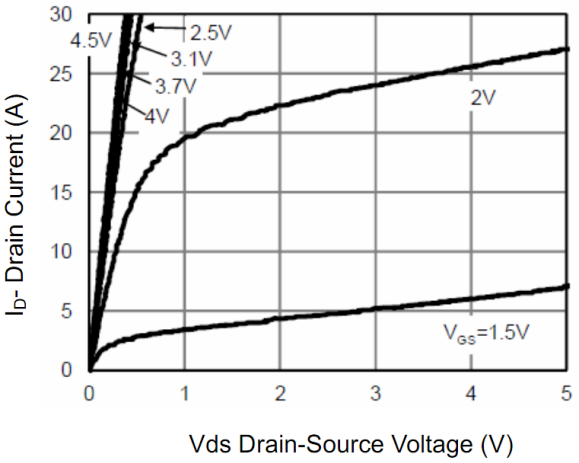


Figure 1 Output Characteristics

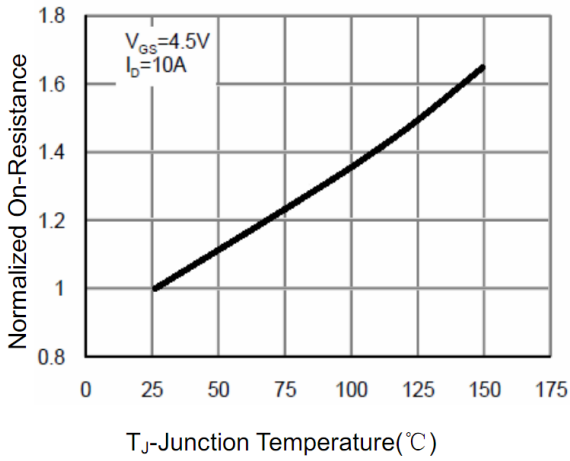


Figure 2 Rdson-Junction Temperature

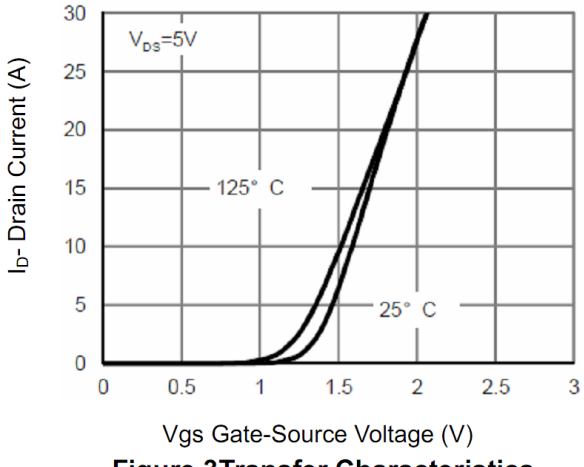


Figure 3Transfer Characteristics

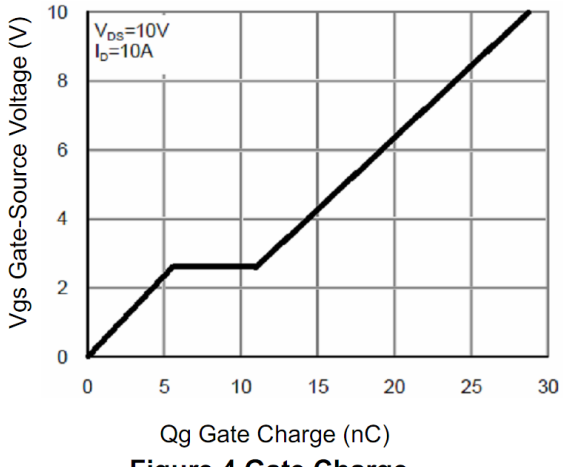


Figure 4 Gate Charge

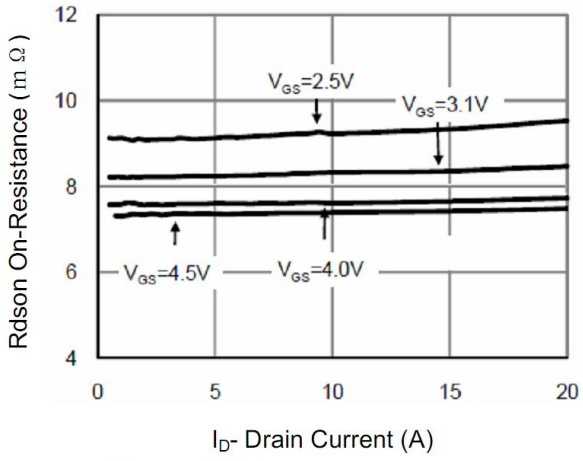


Figure 5 Rdson- Drain Current

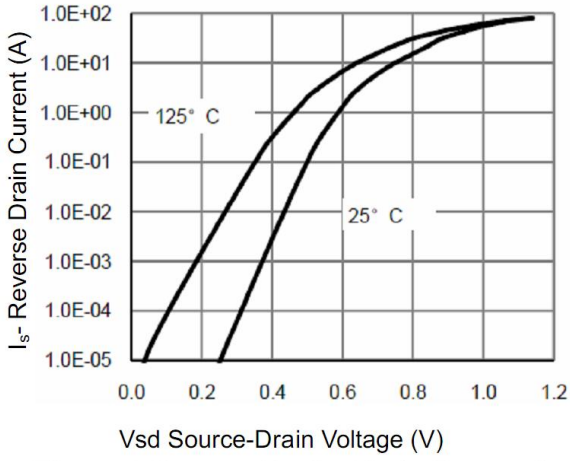


Figure 6 Source- Drain Diode Forward

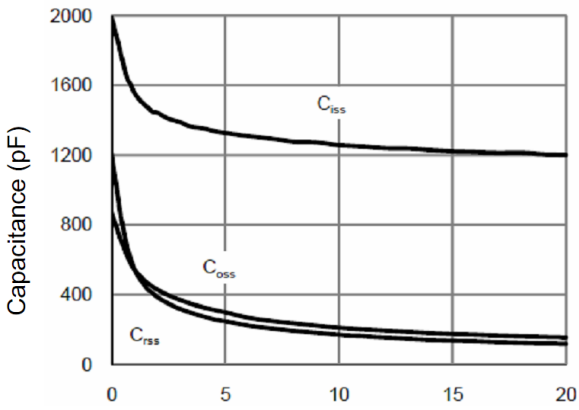


Figure 7 Capacitance vs Vds

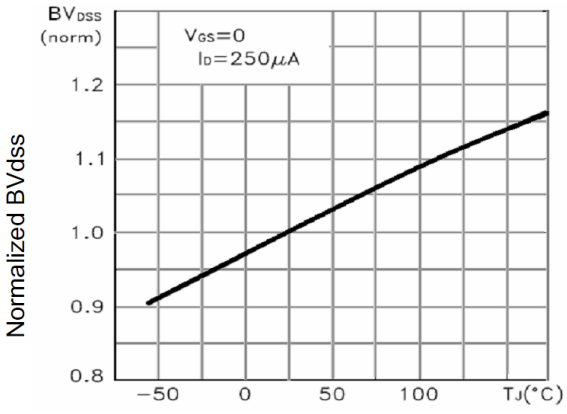


Figure 8 BV_{DSS} vs Junction Temperature

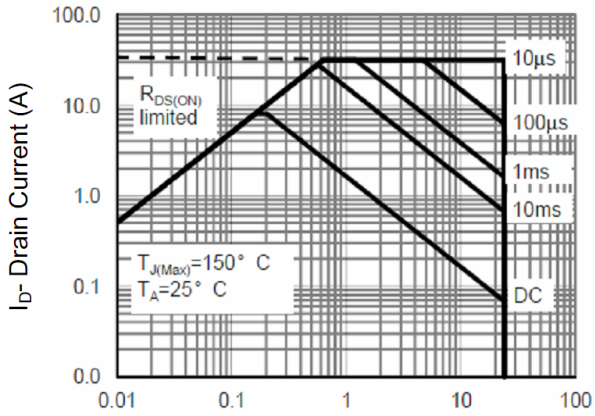


Figure 9 Safe Operation Area

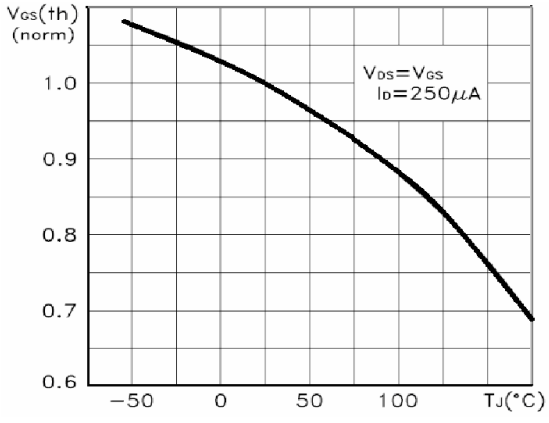
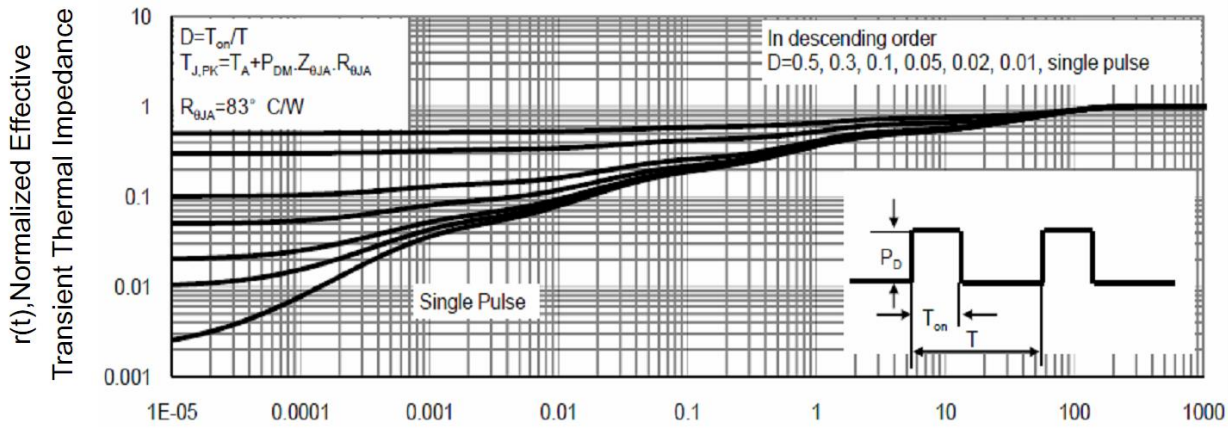
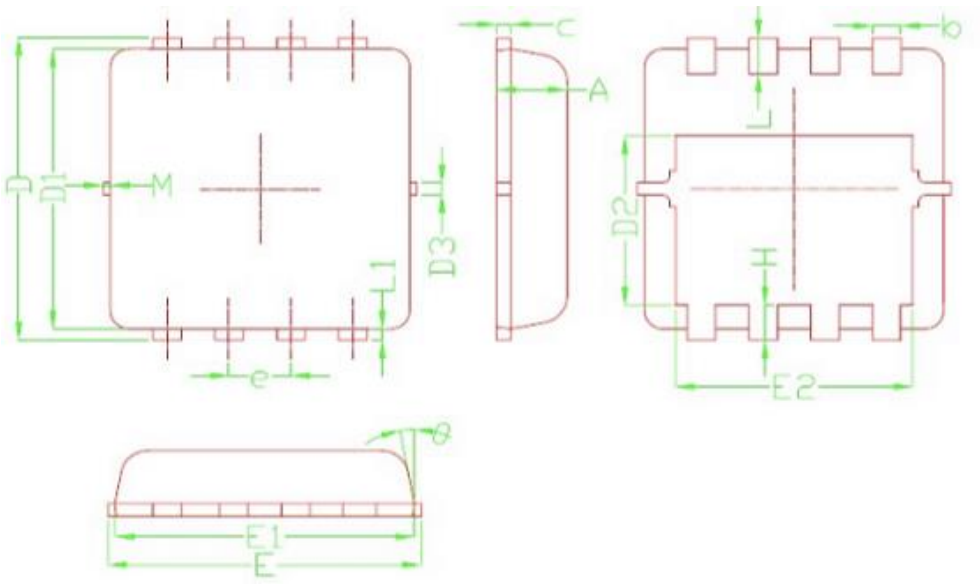


Figure 10 $V_{GS(th)}$ vs Junction Temperature



■ Package Dimensions

PDFN3*3-8L



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.85	0.027	0.034
b	0.20	0.40	0.007	0.016
c	0.10	0.25	0.004	0.010
D	3.15	3.45	0.124	0.136
D1	2.90	3.20	0.114	0.126
D2	1.54	1.98	0.060	0.080
D3	0.10	0.30	0.004	0.012
E	3.15	3.45	0.124	0.136
E1	3.00	3.25	0.118	0.128
E2	2.29	2.65	0.090	0.104
e	0.65 BSC		0.025 BSC	
H	0.28	0.65	0.011	0.026
Θ	0°	14°	0°	14°
L	0.30	0.50	0.012	0.020
L1	0.13		0.005	
M	---	0.15	---	0.006