

SuperMOS –PDFN3*3-8L 45V BV_{DSS} , 16m Ω $R_{DS(on)}$, N-channel MOSFET

1. Description

The ESN4186 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ESN4186 is Pb-free.

2. Features

- 45V, $R_{DS(ON)}=16m\Omega(TYP.) @V_{GS}=10V$
- $R_{DS(ON)}=21m\Omega(TYP.) @V_{GS}=4.5V$
- Use trench MOSFET technology
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ESN4186	PDFN3*3-8L	ESN4186/lot	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

Table-1 Ordering information

5. Pin Configuration and Functions


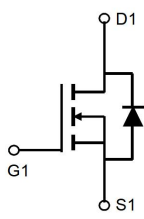
Pin	Function	Outline	Circuit Diagram
1/2/3	Source		
4	Gate		
5/6/7/8	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	BV_{DSS}	45	V	
Gate-Source Voltage	V_{GS}	±20	V	
Continuous Drain Current	I_D	$T_C=25^{\circ}C$	36	A
		$T_C=75^{\circ}C$	28	
Maximum Power Dissipation	P_D	$T_C=25^{\circ}C$	42	W
		$T_C=75^{\circ}C$	25	
Pulsed Drain Current ^a	I_{DM}	144	A	
Avalanche Current, Single Pulsed ^b	I_{AS}	19	A	
Avalanche Energy, Single Pulsed ^b	E_{AS}	54	mJ	
Operating Junction Temperature	T_J	150	°C	
Lead Temperature	T_L	260	°C	
Storage Temperature Range	T_{stg}	-55 to 150	°C	

Thermal resistance ratings

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Case Thermal Resistance ^a	$t \leq 10$ s	$R_{\theta JC}$	2.5	3	°C/W

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b: $T_J=25^{\circ}C$, $V_{DD}=45V$, $V_G=10V$, $L=0.3mH$, $R_g=25\Omega$

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	45			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=45V, V_{GS}=0V$			1.0	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.4	1.8	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		16	21	m Ω
		$V_{GS}=4.5V, I_D=15A$		21	29	
Forward Trans conductance	g_{FS}	$V_{DS}=5.0V, I_D=20A$			80	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=20V$		980		pF
Output Capacitance	C_{OSS}			130		
Reverse Transfer Capacitance	C_{RSS}			80		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=20V,$ $I_D=20A$		17		nC
Gate-to-Source Charge	Q_{GS}			2.5		
Gate-to-Drain Charge	Q_{GD}			4.5		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=20V,$ $R_L=1.5\Omega, R_{GEN}=3\Omega$		6.5		ns
Rise Time	t_r			17.6		
Turn-Off Delay Time	$t_{d(OFF)}$			19.8		
Fall Time	t_f			16.6		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1.0A$	0.45		1.5	V

7. Typical Characteristic

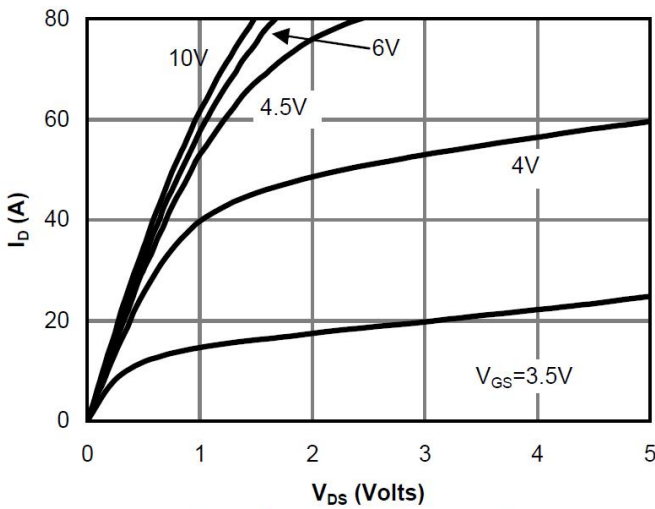


Fig 1: On-Region Characteristics

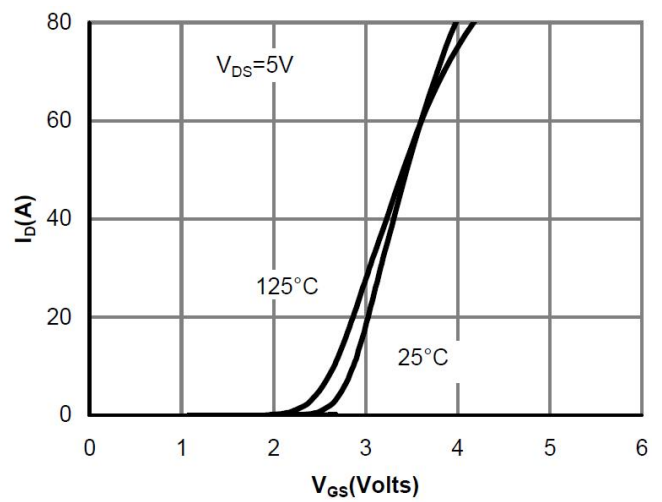


Figure 2: Transfer Characteristics

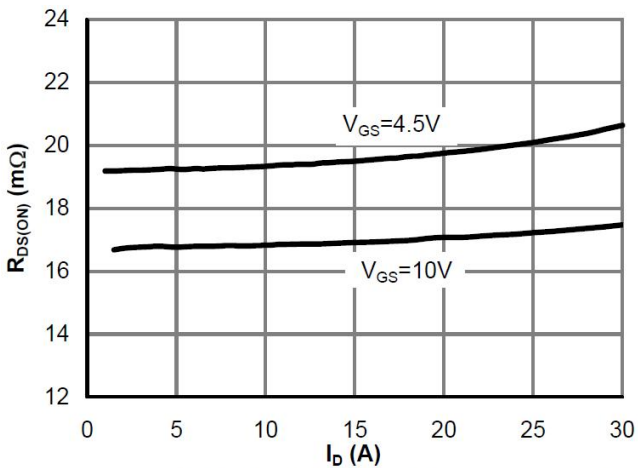


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

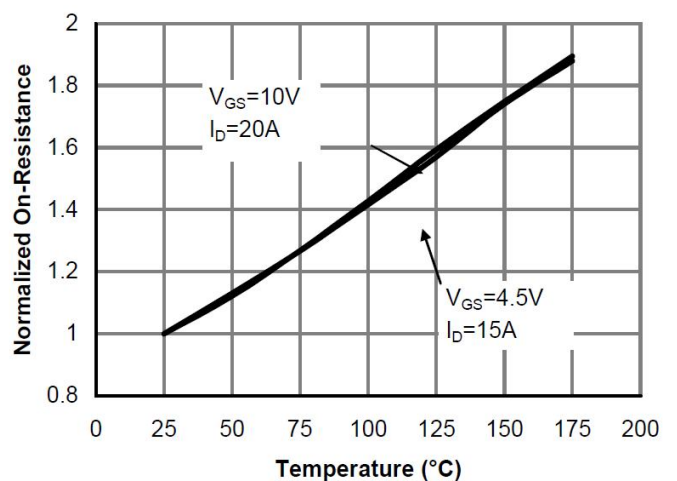


Figure 4: On-Resistance vs. Junction Temperature

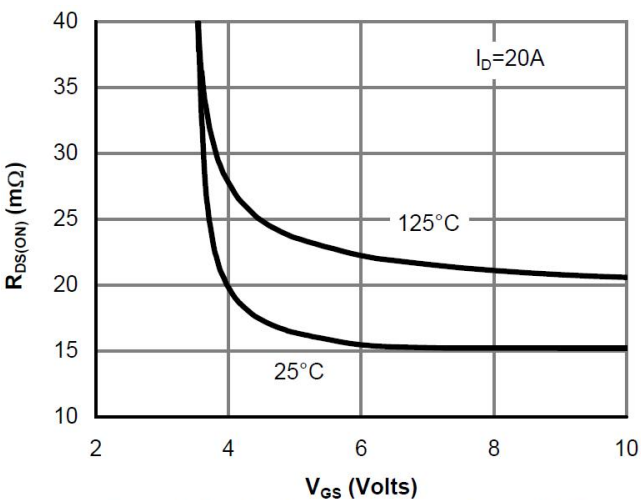


Figure 5: On-Resistance vs. Gate-Source Voltage

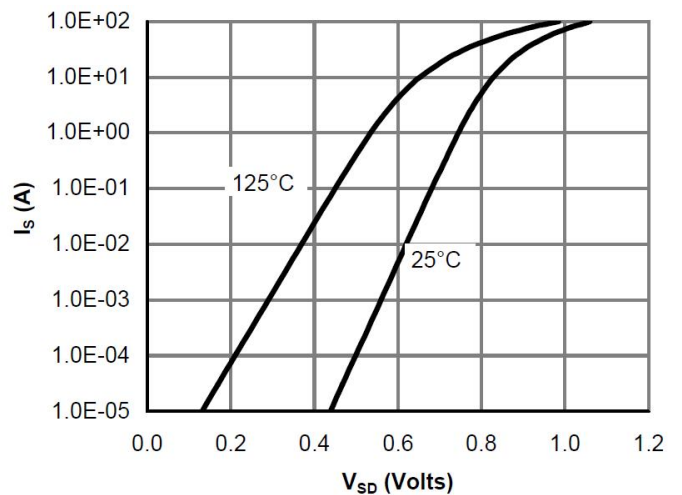


Figure 6: Body-Diode Characteristics

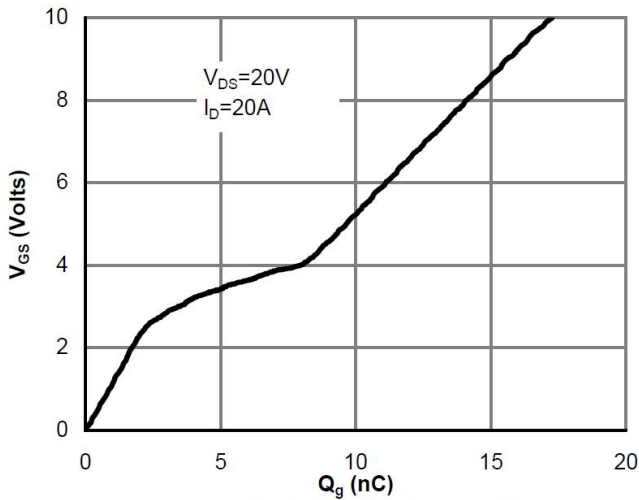


Figure 7: Gate-Charge Characteristics

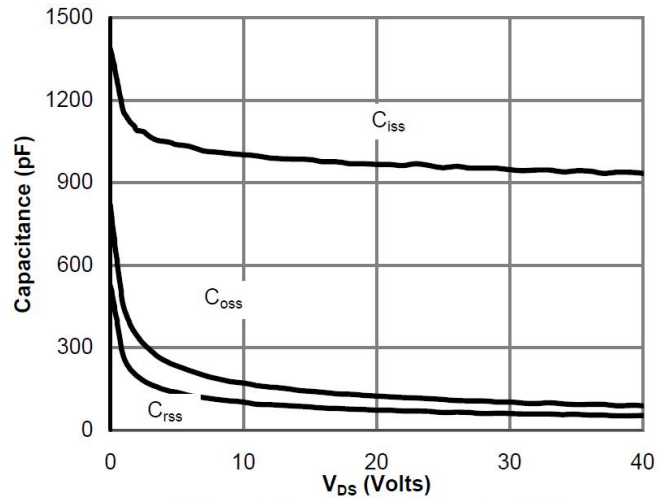


Figure 8: Capacitance Characteristics

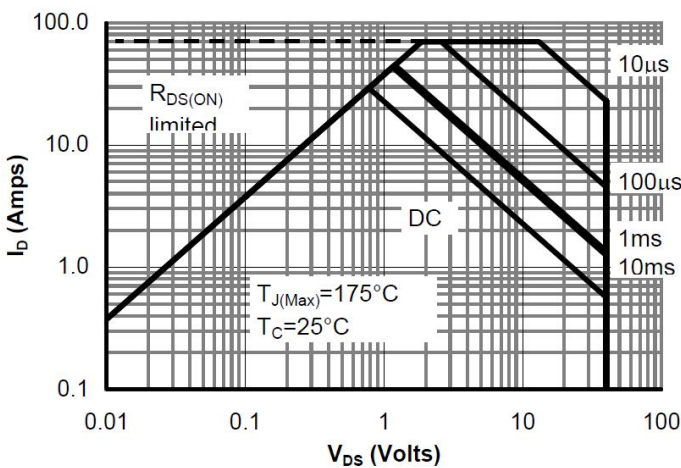


Figure 9: Maximum Forward Biased Safe Operating Area

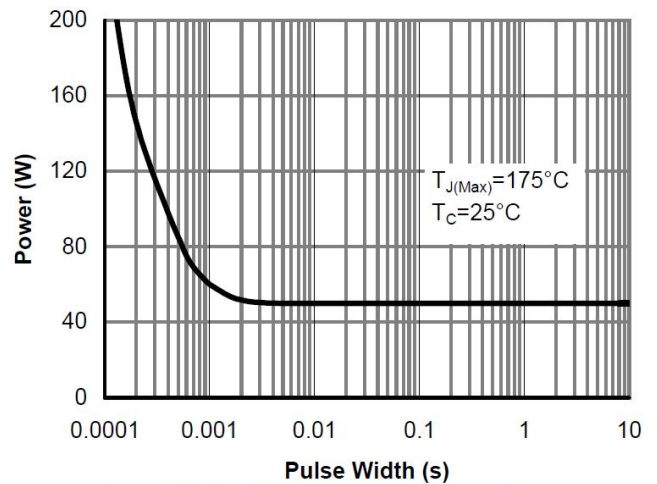


Figure 10: Single Pulse Power Rating Junction-to-Case

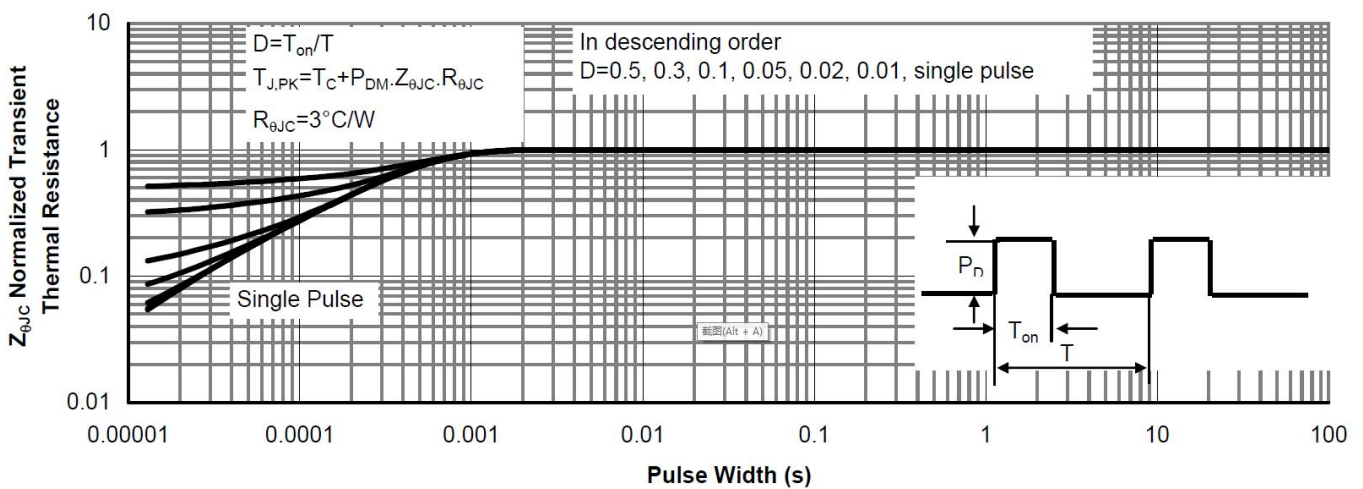
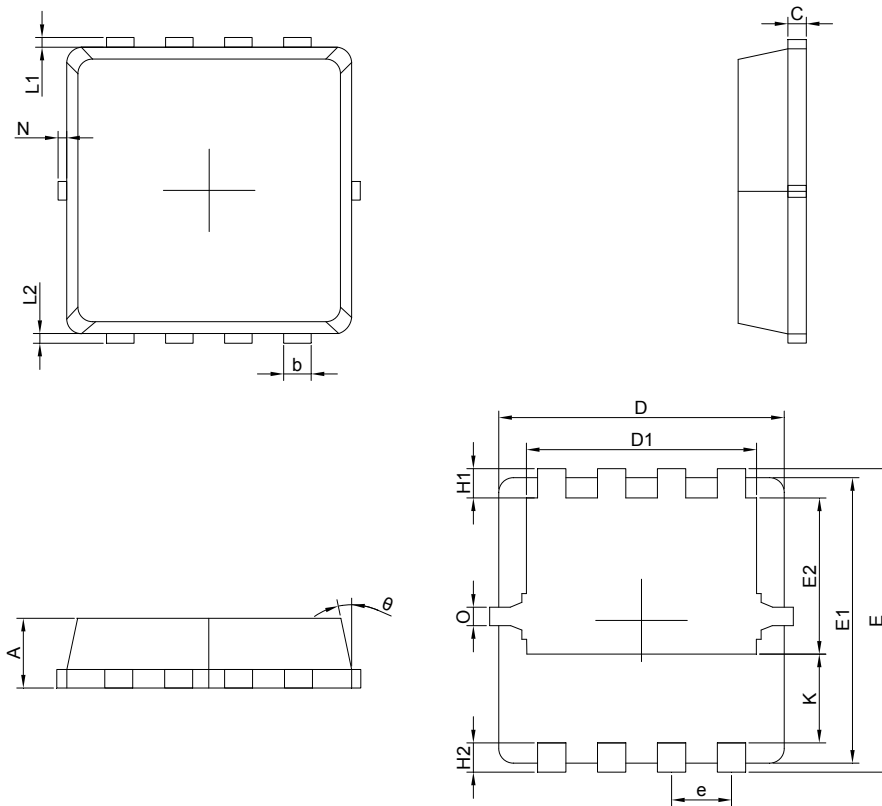


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension (PDFN3*3-8L)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.65	0.75	0.85	e	0.65 BSC.		
b	0.25	0.30	0.35	H1	0.21	0.31	0.41
C	0.15	0.20	0.25	H2	0.30	0.40	0.50
D	3.00	3.10	3.20	K	0.78	0.88	0.98
D1	2.40	2.50	2.60	L1/L2	0.10 REF.		
E	3.20	3.30	3.40	theta	11°	12°	13°
E1	3.00	3.10	3.20	N	0	-	0.15
E2	1.60	1.70	1.80	O	0.2 REF.		

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