

SuperMOS –PDFN3*3-8L 45V BV_{DSS}, 16mΩ 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)}=16mΩ(TYP.) @V_{GS}=10V
R_{DS(ON)}=21mΩ(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

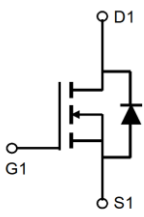
Pin	Function	Outline	Circuit Diagram
1/2/3	Source		
4	Gate		
5/6/7/8	Drain		

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	$T_C=25^{\circ}\text{C}$	I_D	36	A
	$T_C=75^{\circ}\text{C}$		28	
Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	P_D	42	W
	$T_C=75^{\circ}\text{C}$		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	$^{\circ}\text{C}$
Lead Temperature		T_L	260	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-55 to 150	$^{\circ}\text{C}$

Thermal resistance ratings

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

Note:

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

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

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 =250uA	45			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =45V, V _{GS} =0V			1.0	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.0	1.4	1.8	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		16	21	mΩ
		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 =1.5Ω, R _{GEN} =3Ω		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

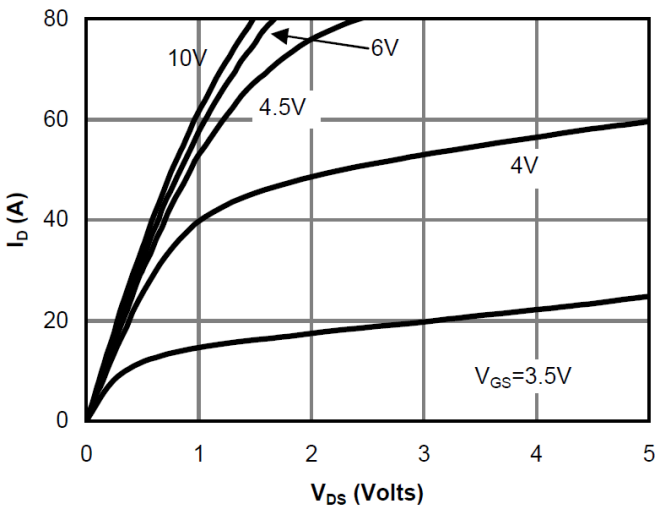


Fig 1: On-Region Characteristics

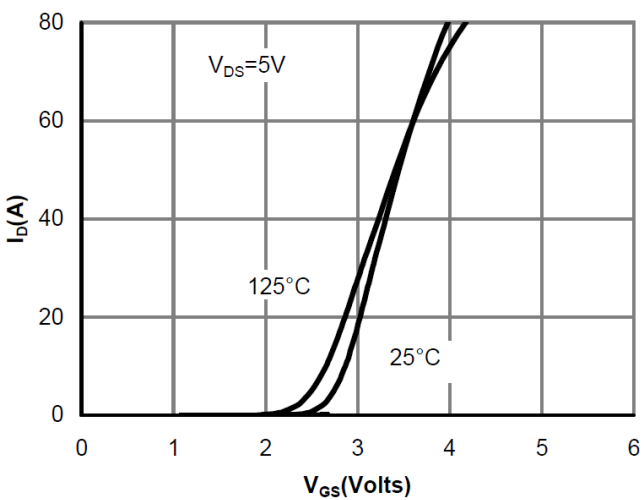


Figure 2: Transfer Characteristics

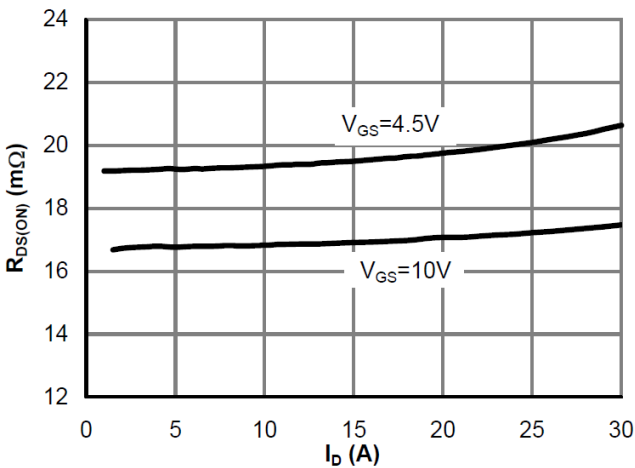


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

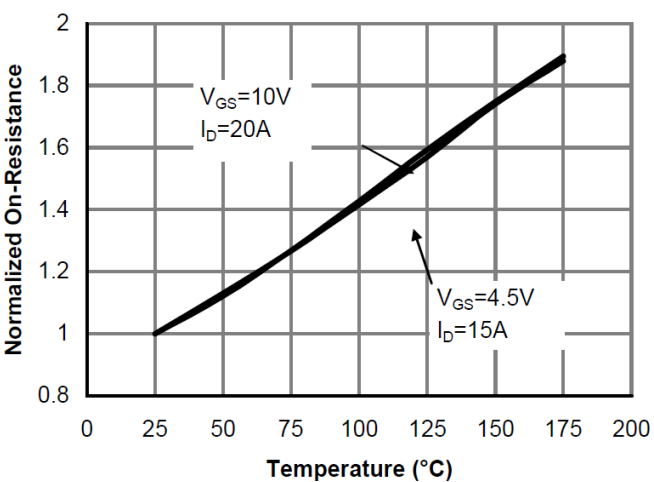


Figure 4: On-Resistance vs. Junction Temperature

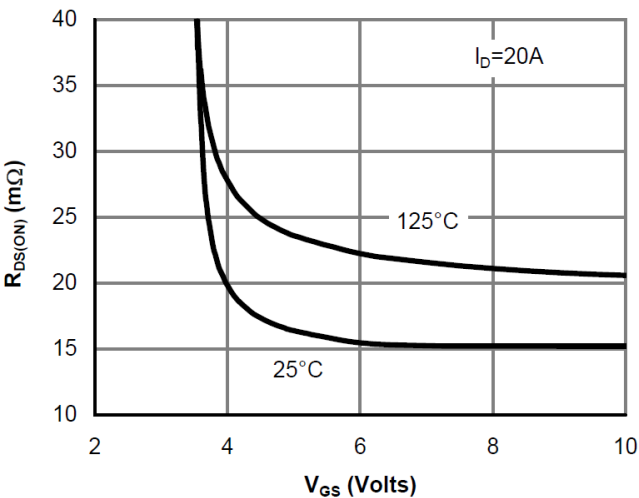


Figure 5: On-Resistance vs. Gate-Source Voltage

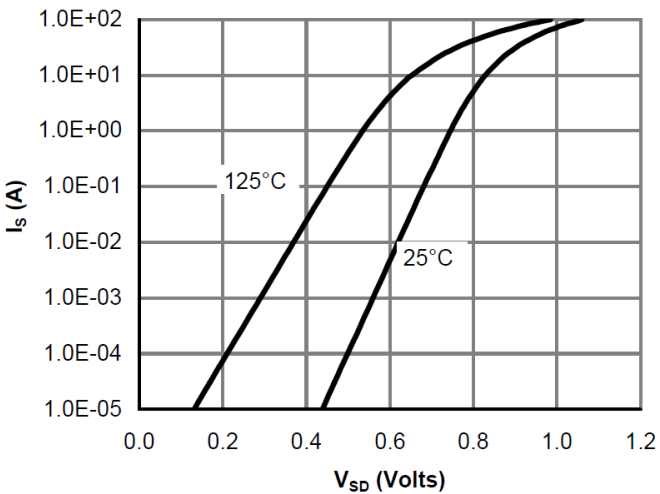
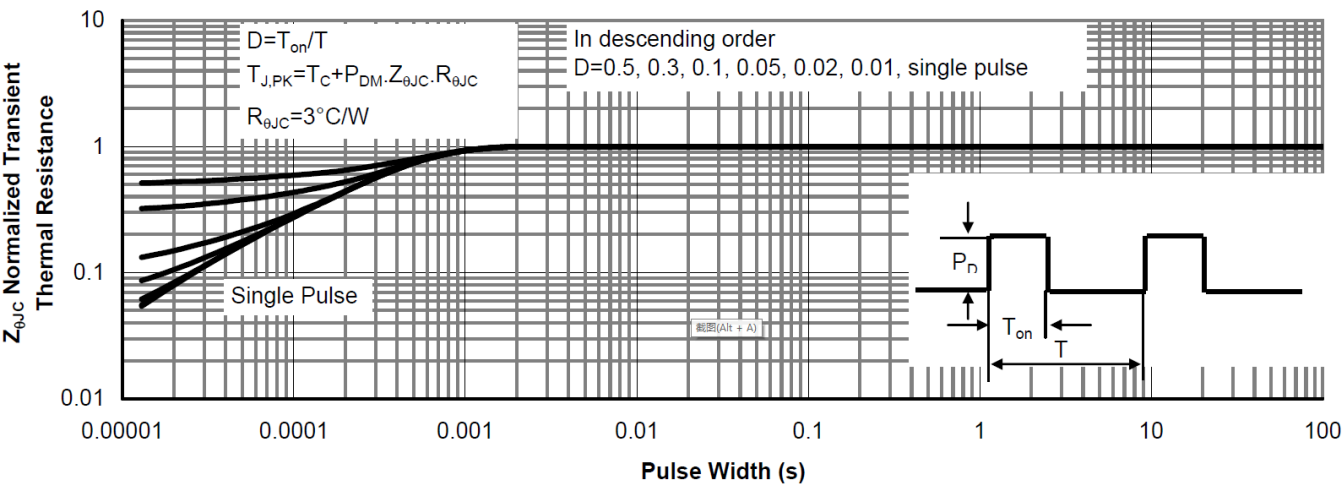
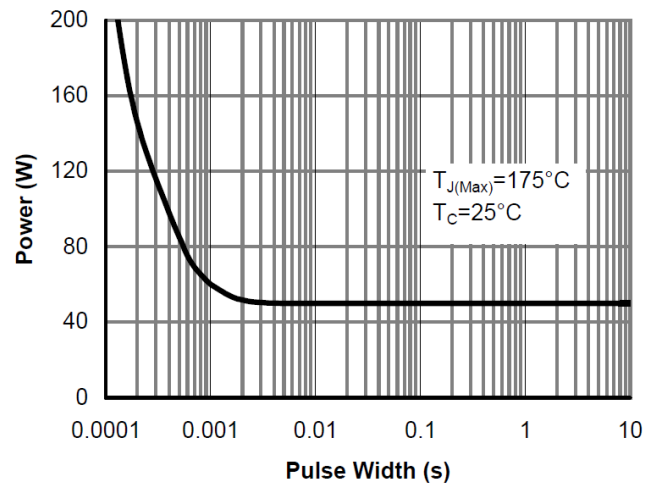
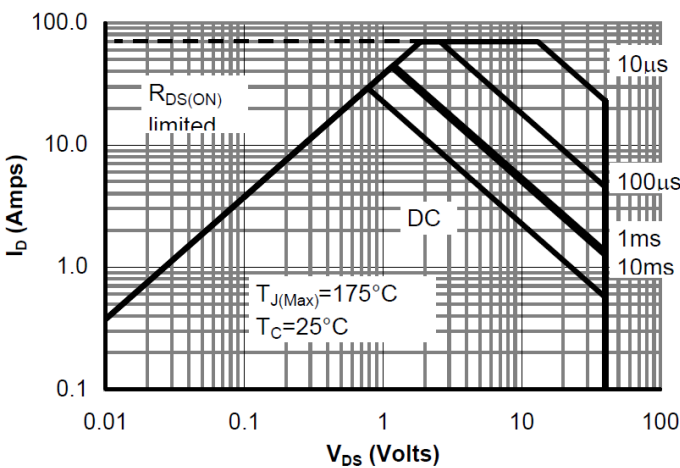
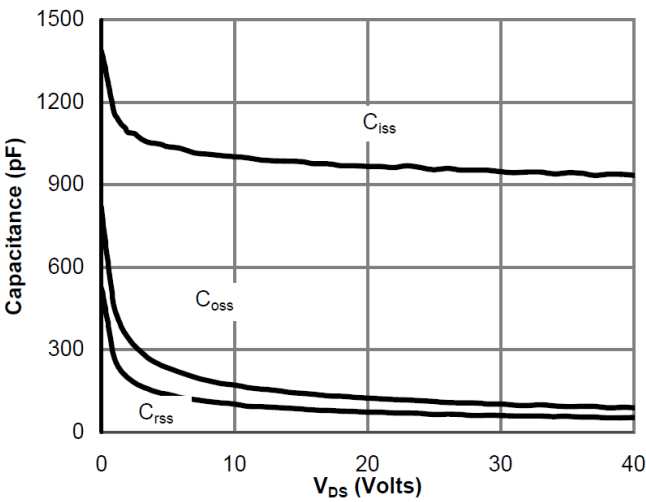
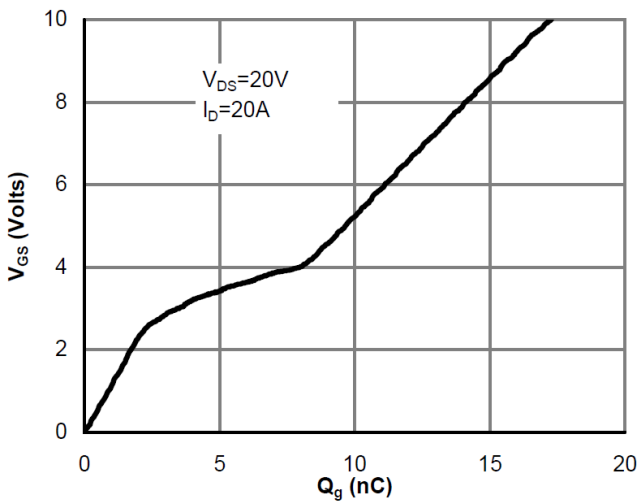
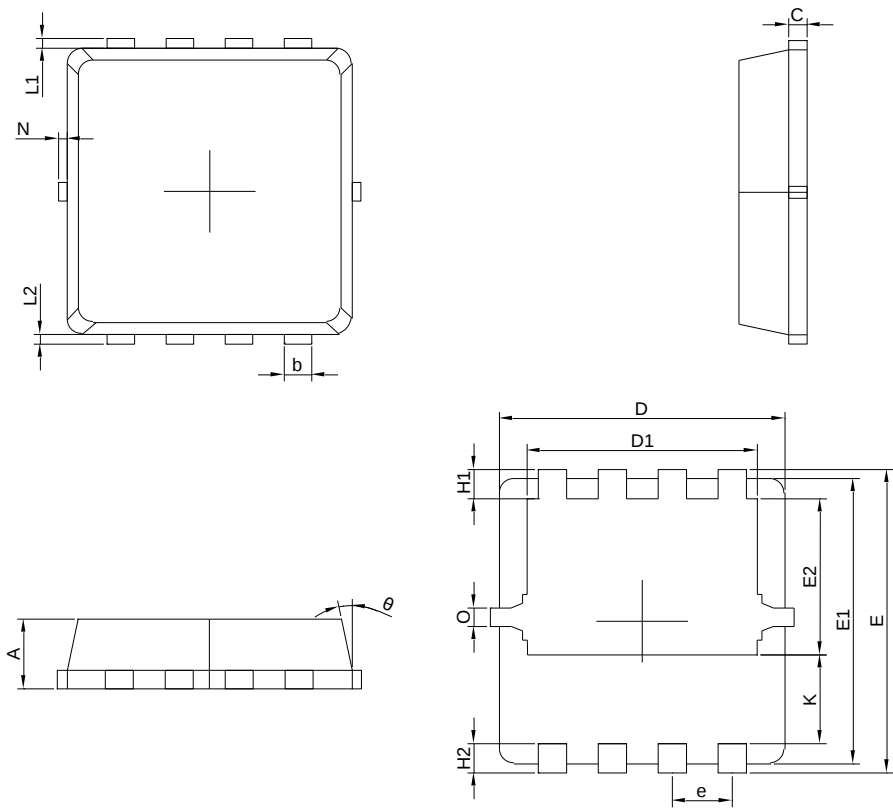


Figure 6: Body-Diode Characteristics



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	θ	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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