

**SuperMOS –PDFN5\*6-8L 30V BV<sub>DSS</sub> 7mΩ R<sub>DS(on)</sub> 43A I<sub>D</sub>, N-channel MOSFET**

**1. Description**

The ESN6586 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ESN6586 is Pb-free.

**2. Features**

- 30V, R<sub>DS(ON)</sub>=7mΩ(Typ), V<sub>GS</sub>=10V  
R<sub>DS(ON)</sub>=10.5mΩ(Typ), V<sub>GS</sub>=4.5V
- Use trench MOSFET technology
- High density cell design for low R<sub>DS(on)</sub>
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

**3. Applications**


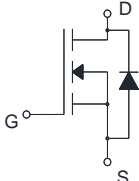
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**100% UIS TESTED!**

**4. Ordering Information**

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ESN6586	PDFN5*6-8L	ESN6586/lot	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

**5. Pin Configuration and Functions**

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

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$BV_{DSS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	43
		$T_C=75^\circ C$	33
Maximum Power Dissipation	$P_D$	$T_C=25^\circ C$	42
		$T_C=75^\circ C$	25
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	150	A
Avalanche Current, Single Pulsed <sup>b</sup>	$I_{AS}$	20	A
Avalanche Energy, Single Pulsed <sup>b</sup>	$E_{AS}$	60	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	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10$ s	$R_{\theta JA}$	40	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	3	

Note:

a: Repetitive rating, pulse width limited by junction temperature,  $t_p=10\mu s$ , Duty Cycle=1%

b: EAS condition:  $T_J=25^\circ C, V_{DD}=30V, V_G=10V, L=0.3mH, R_g=25\Omega$

## Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1.0	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
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	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		7	12	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$		10.5	18	
Forward Trans conductance	$g_{FS}$	$V_{DS}=5.0V, I_D=20A$			100	S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz, V_{DS}=15V$		1150		pF
Output Capacitance	$C_{OSS}$			180		
Reverse Transfer Capacitance	$C_{RSS}$			105		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=4.5V, V_{DS}=15V, I_D=20A$		20		nC
Gate-to-Source Charge	$Q_{GS}$			2.8		
Gate-to-Drain Charge	$Q_{GD}$			5		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=20V, R_L=0.75\Omega, R_G=6\Omega$		6.6		ns
Rise Time	$t_r$			2		
Turn-Off Delay Time	$t_{d(OFF)}$			18		
Fall Time	$t_f$			3.3		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.9A$		0.7	1.5	V

7. Typical Characteristic

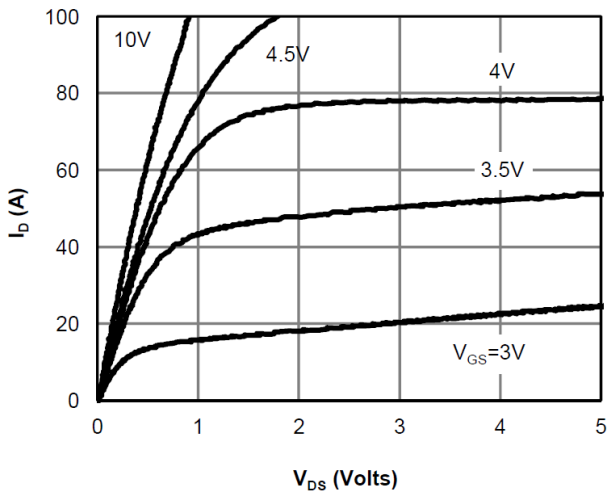


Figure 1: On-Region Characteristics

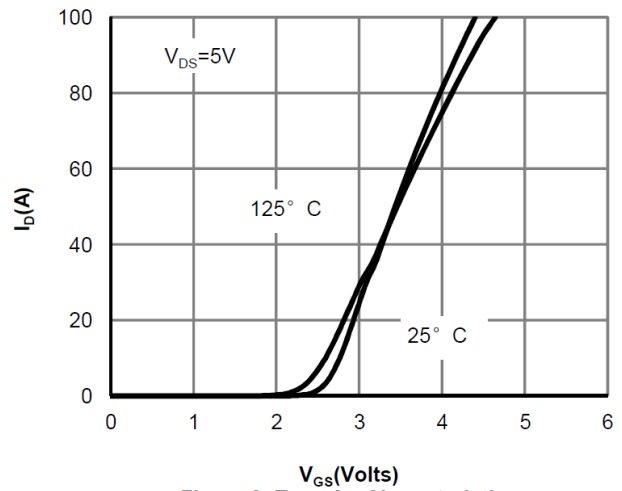


Figure 2: Transfer Characteristics

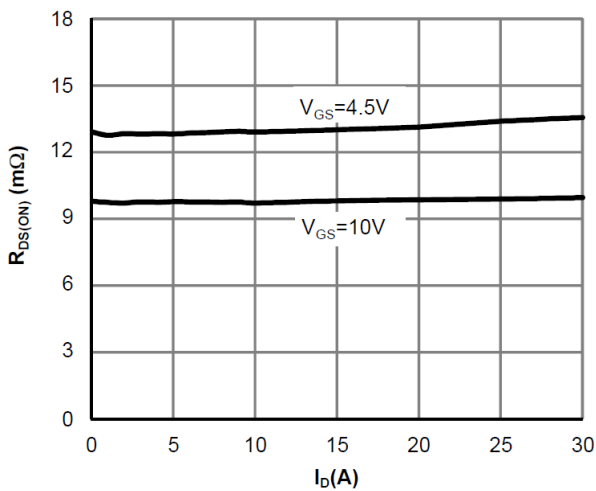


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

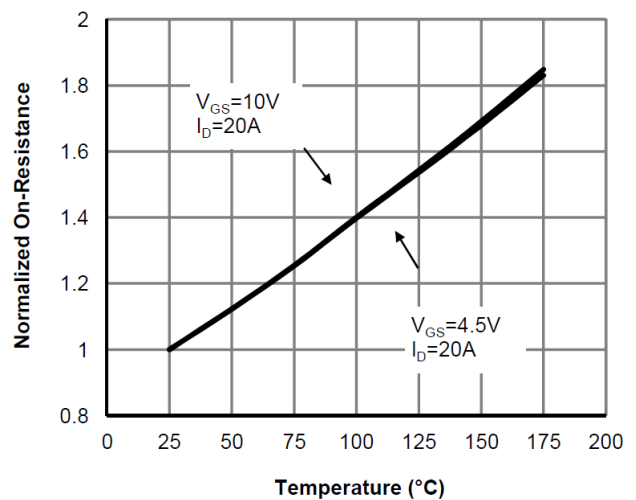


Figure 4: On-Resistance vs. Junction Temperature

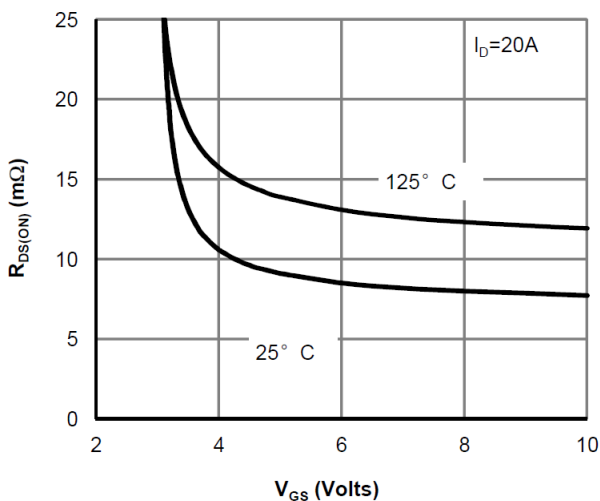


Figure 5: On-Resistance vs. Gate-Source Voltage

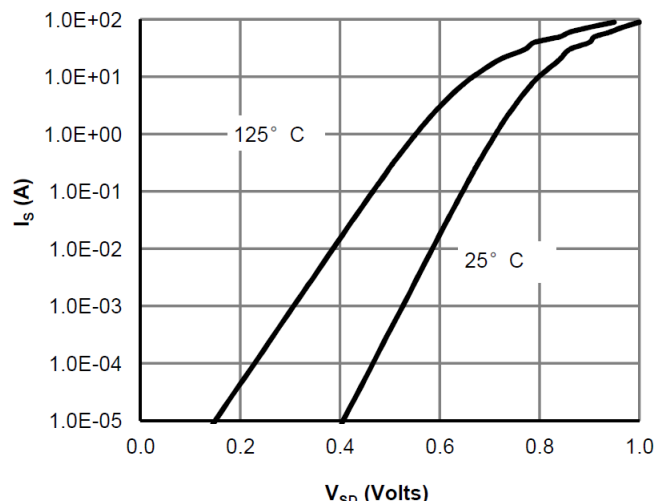


Figure 6: Body-Diode Characteristics

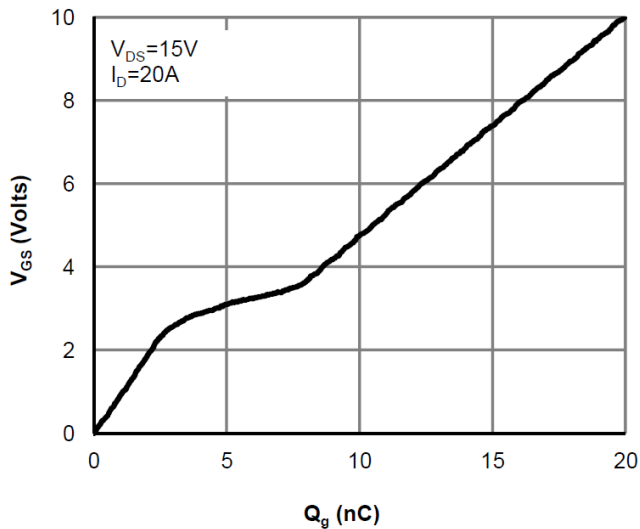


Figure 7: Gate-Charge Characteristics

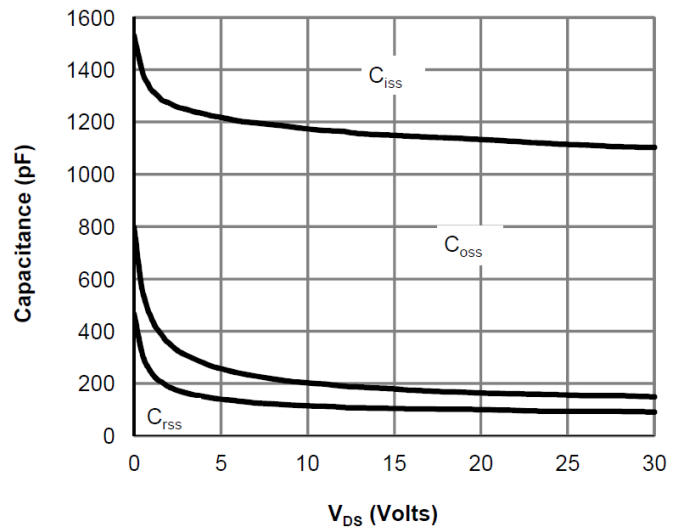


Figure 8: Capacitance Characteristics

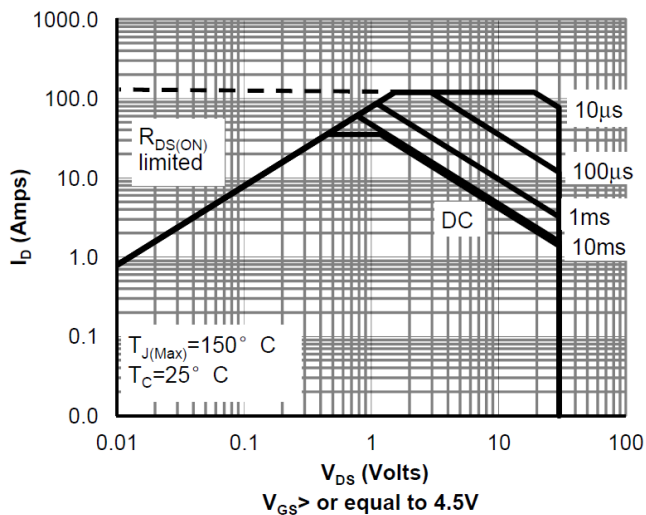


Figure 9: Maximum Forward Biased Safe Operating Area

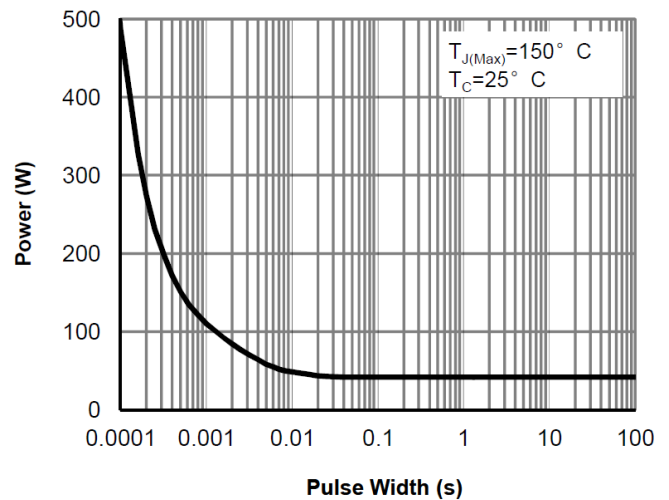


Figure 10: Single Pulse Power Rating Junction-to-Case

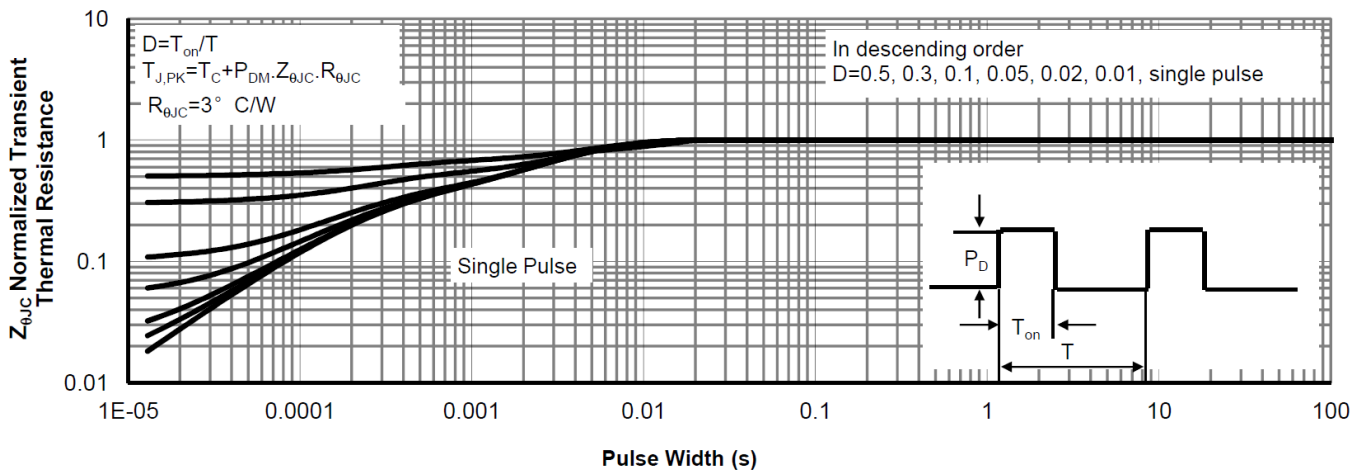
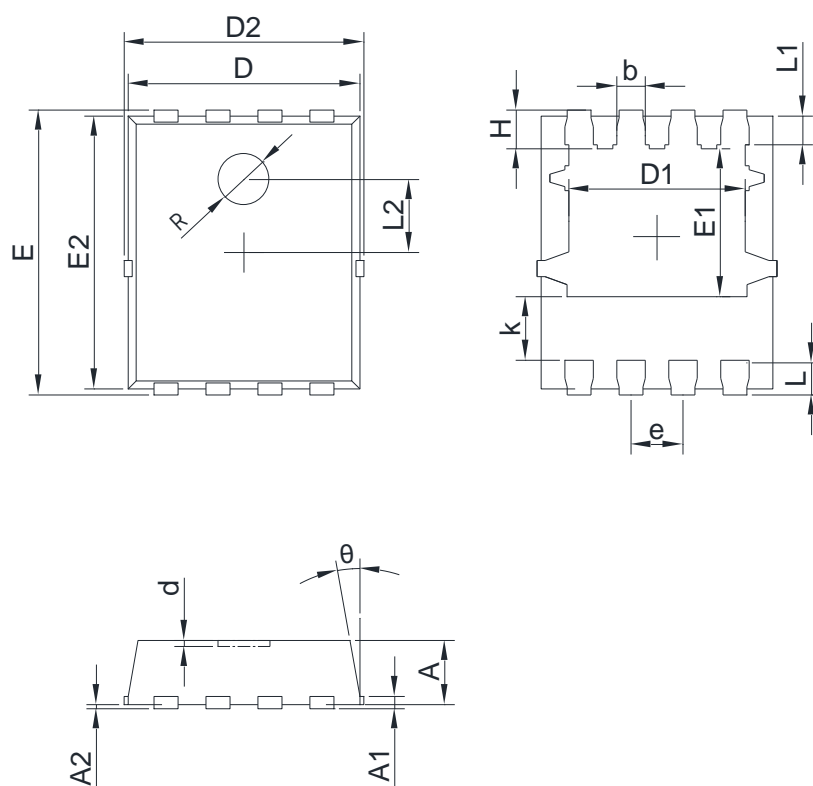


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension (PDFN5\*6-8L)



Unit: mm

COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	Typ.	MAX		MIN	Typ.	MAX
A	0.900	1.000	1.100	e	1.270 TYP.		
A1	0.254 REF			l	0.534	0.610	0.686
A2	0~0.05			L1	0.424	0.500	0.576
D	4.824	4.900	4.976	L2	1.800 REF.		
D1	3.910	4.010	4.110	k	1.190	1.290	1.390
D2	4.924	5.000	5.076	H	0.549	0.625	0.701
E	5.924	6.000	6.076	θ	8°	10°	12°
E1	3.375	3.475	3.575	R	1.100	1.200	1.300
E2	5.674	5.750	5.826	d			0.100
b	0.350	0.400	0.450				

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