

SuperMOS – PDFN5*6-8L -30V BV_{DSS}, 8.5mΩ R_{DS(on)}, P-channel MOSFET

1. Description

The ESN21307 is P-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 ESN21307 is Pb-free.

2. Features

- -30V, R_{DS(ON)}=8.5mΩ(TYP.) @V_{GS}=-10V
R_{DS(ON)}=12.5mΩ(TYP.) @V_{GS}=-4.5V
 - Fast Switching
 - High density cell design for low R_{DS(on)}
- Material: Halogen free
 - Reliable and rugged
 - Avalanche Rated
 - Low leakage current

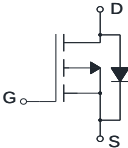
3. Applications

- 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
ESN21307	PDFN5*6-8L	ESN21307/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	Note c 	
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}	±25	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	-45	A
	$T_C=75^{\circ}\text{C}$		-35	
Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	P_D	38	W
	$T_C=75^{\circ}\text{C}$		23	
Pulsed Drain Current ^a		I_{DM}	-150	A
Avalanche Current, Single Pulsed ^b		I_{AS}	25	A
Avalanche Energy, Single Pulsed ^b		E_{AS}	93.7	mJ
Operating Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{stg}	-55 to +150	°C

Thermal resistance ratings

Parameter		Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10 \text{ s}$	$R_{\theta JA}$	25	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	3.3	

Note:

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

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

c: This diagram is only an electrical schematic, and the actual pin size is based on POD.

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	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±25V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.5	-2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		8.5	12	mΩ
		V _{GS} =-4.5V, I _D =-20A		12.5	18	
Forward Trans conductance	g _{FS}	V _{DS} =-5.0V, I _D =-20A			100	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =-15V		1980		pF
Output Capacitance	C _{OSS}			335		
Reverse Transfer Capacitance	C _{RSS}			260		
Gate Resistance	R _g	f=1MHZ		4.5		Ω
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		36		nC
Gate-to-Source Charge	Q _{GS}			6.0		
Gate-to-Drain Charge	Q _{GD}			9.4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-15V, R _L =1Ω, R _G =3Ω		12		ns
Rise Time	t _r			7		
Turn-Off Delay Time	t _{d(OFF)}			48		
Fall Time	t _f			19		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-20A		-0.85	-1.5	V

7. Typical Characteristic

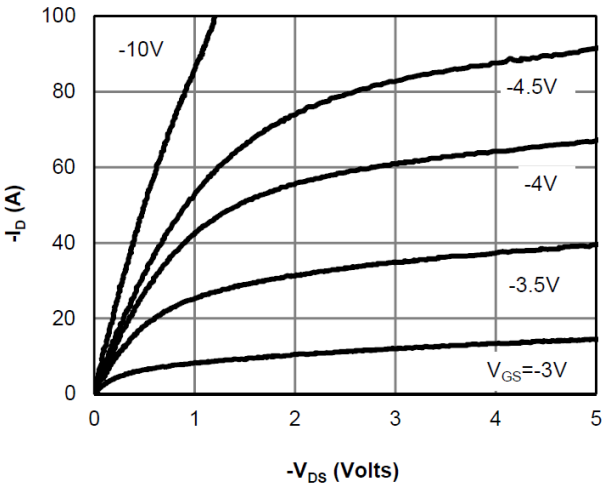


Figure 1: On-Region Characteristics

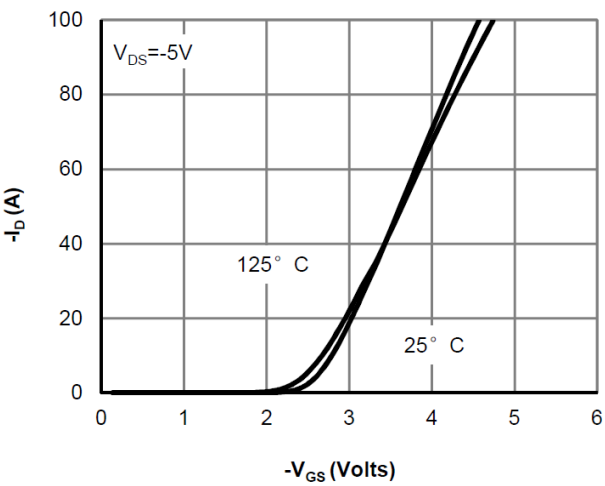


Figure 2: Transfer Characteristics

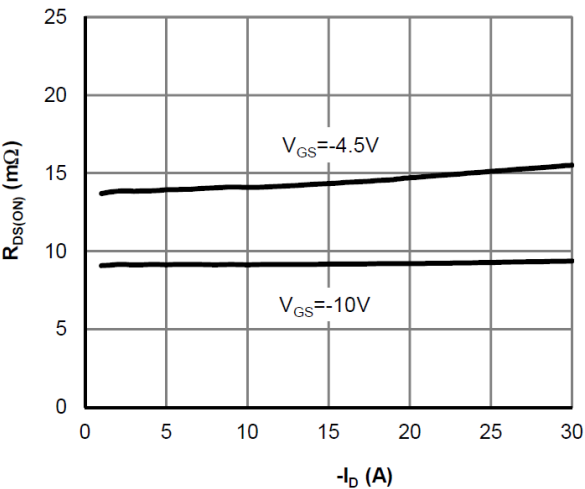


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

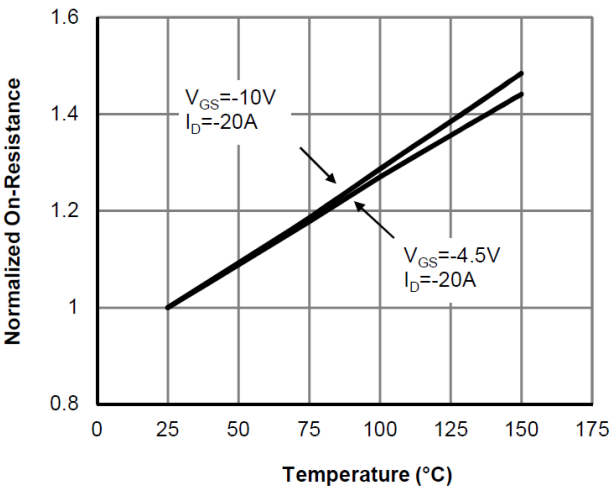


Figure 4: On-Resistance vs. Junction Temperature

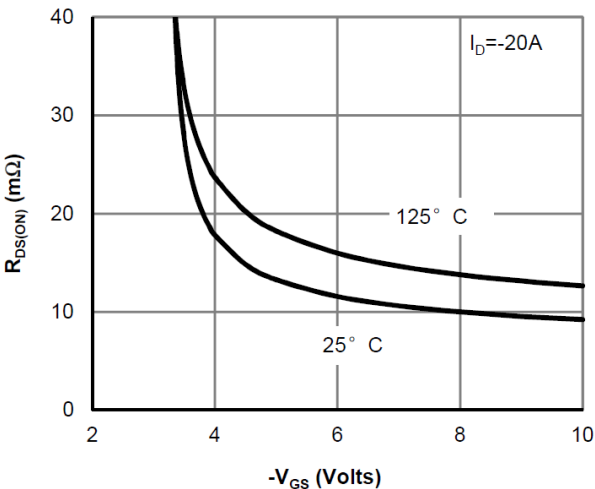


Figure 5: On-Resistance vs. Gate-Source Voltage

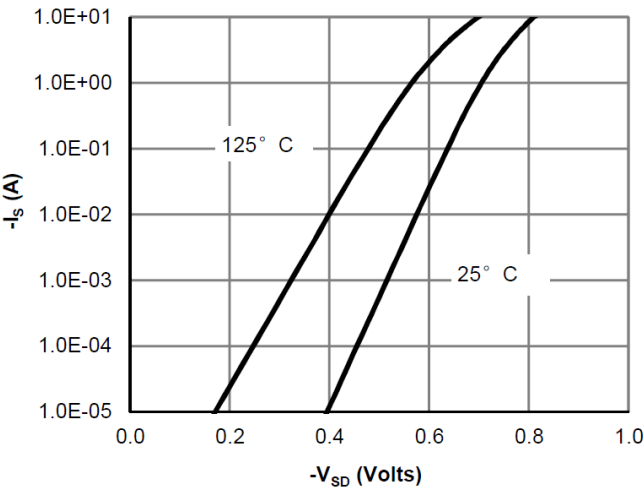


Figure 6: Body-Diode Characteristics

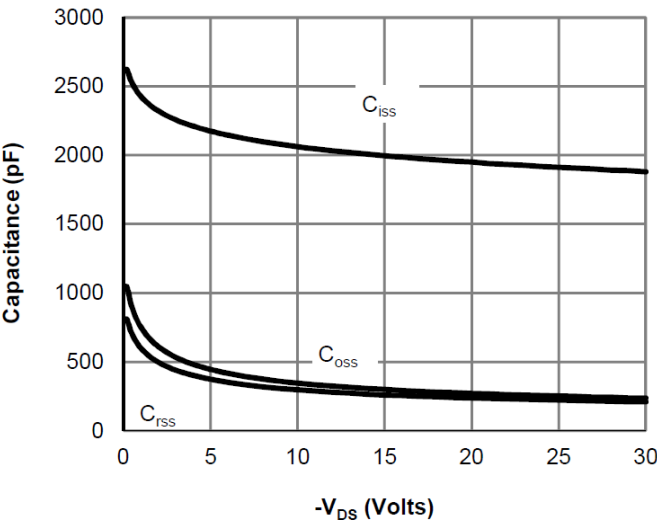
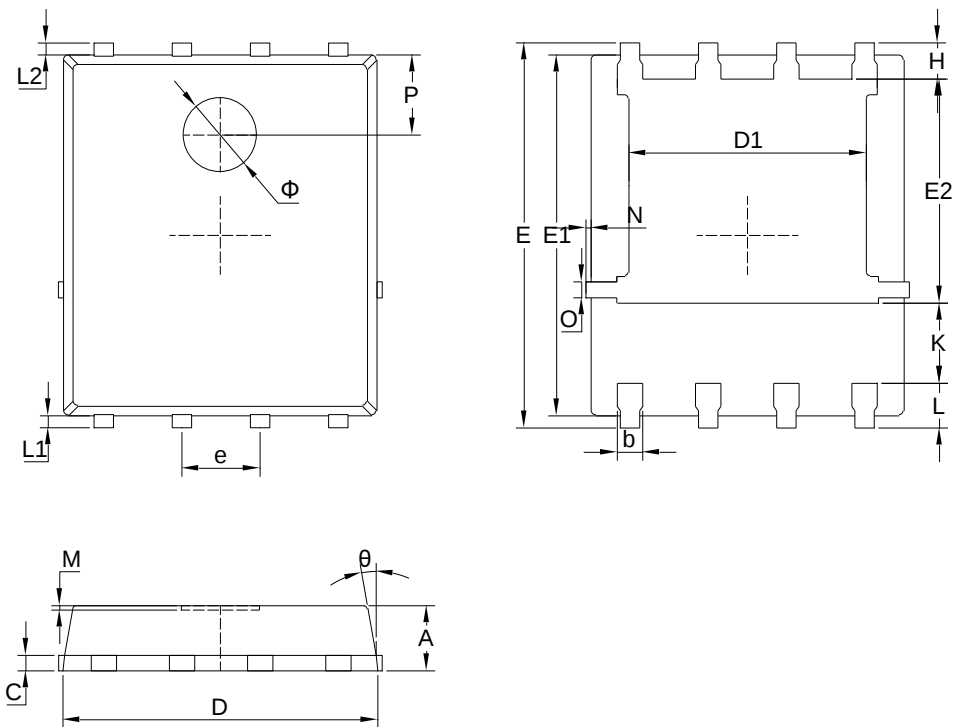


Figure 7: Capacitance Characteristics

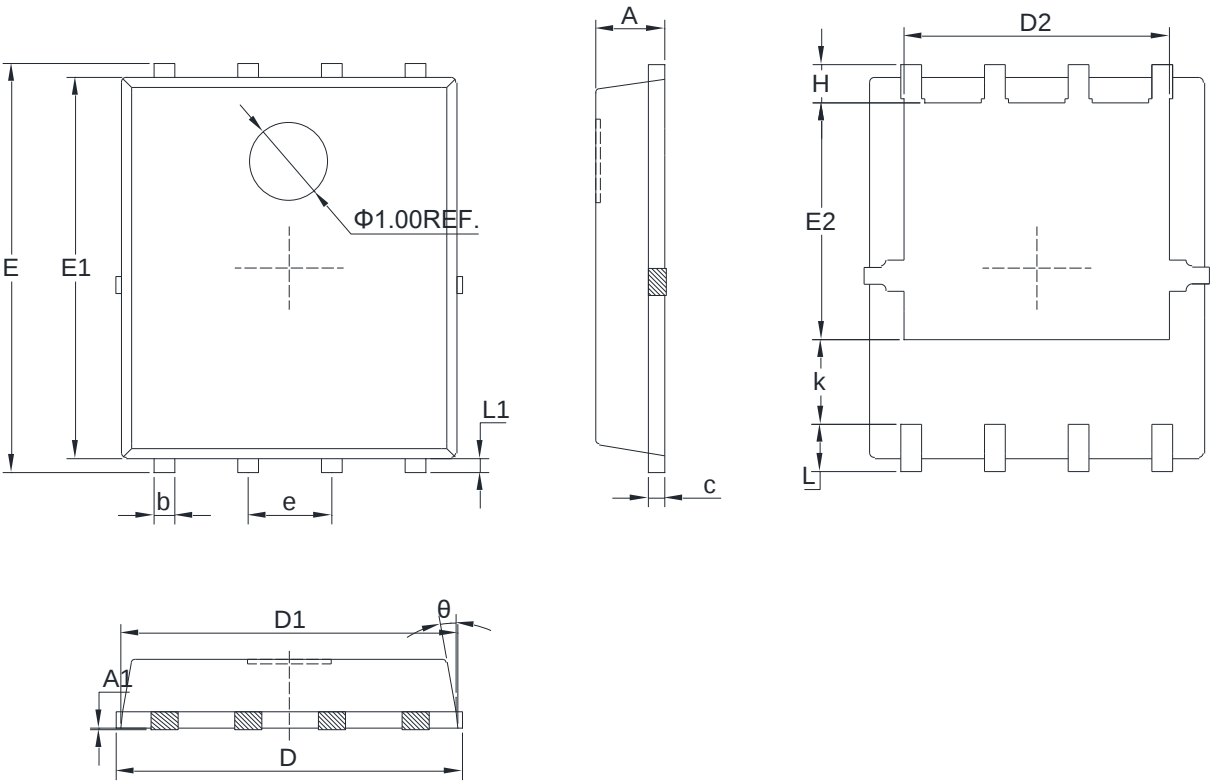
8. Dimension (PDFN5*6-8L)

POD A(J)



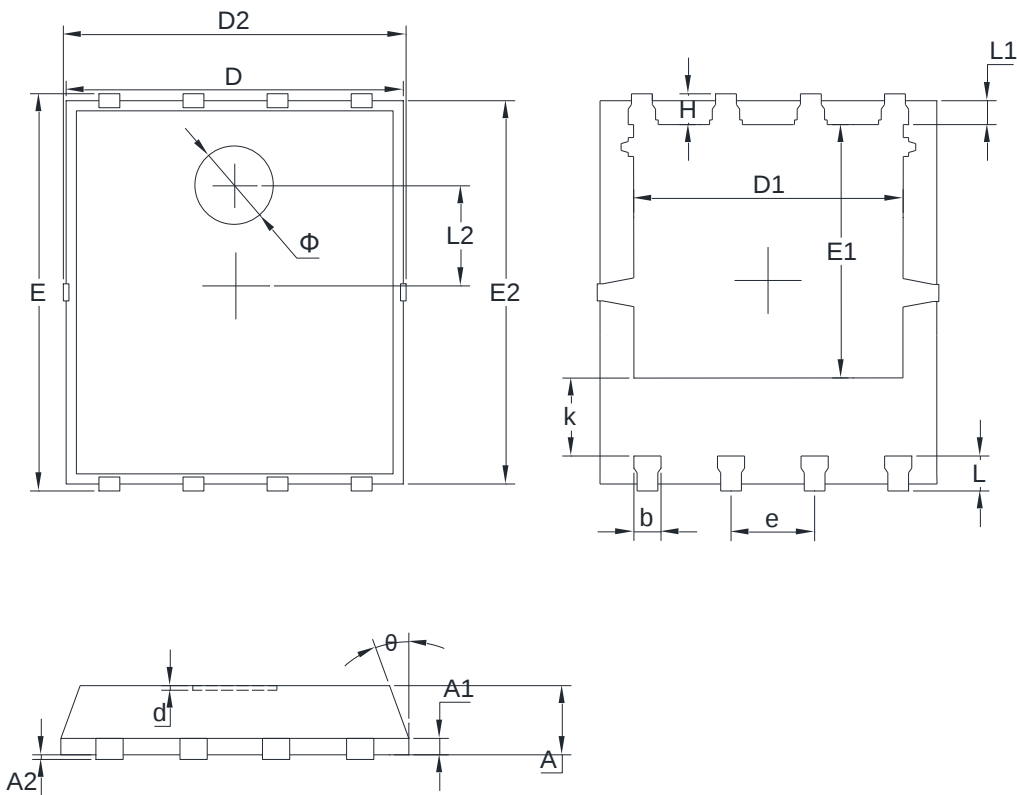
Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0. 90	1. 05	1. 20	H	0. 48	0. 58	0. 68
b	0. 35	0. 40	0.50	K	1. 17	1. 27	1. 37
C	0. 20	0. 25	0. 35	L	0. 64	0. 74	0. 84
D	4. 90	5. 05	5. 20	L1/L2	0. 20 REF.		
D1	3.72	3. 82	3. 92	θ	8°	10°	12°
E	6. 00	6. 15	6. 30	M	0. 08 REF.		
E1	5. 60	5. 75	5. 90	N	0	-	0. 15
E2	3. 47	3. 57	3. 67	O	0. 25 REF.		
e	1. 27 BSC.			P	1. 28 REF.		
Φ	1.20 REF						

POD B(Q)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.90	1.00	1.10	H	0.46	0.56	0.66
A1			0.05	k	1.10		
b	0.30	0.40	0.50	L	0.51	0.61	0.71
c	0.20	0.25	0.30	L1	0.05	0.15	0.25
D	4.80	5.10	5.40	θ	8°	10°	12°
D2	3.75	3.90	4.05	D1	4.80	4.90	5.00
E	5.95	6.05	6.15				
E1	5.65	5.75	5.85				
e	1.27BCS						
E2	3.34	3.49	3.64				

POD C(X)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.900	1.000	1.100	H	0.549	0.625	0.701
A1	0.254 REF			k	1.190	1.290	1.390
A2	0.000		0.050	L	0.534	0.610	0.686
D	4.824	4.900	4.976	L1	0.424	0.500	0.576
D1	3.910	4.010	4.110	θ	8°	10°	12°
D2	4.924	5.000	5.076	L2	1.800 REF		
E	5.924	6.000	6.076	ϕ	1.100	1.200	1.300
E1	3.375	3.475	3.575	d			0.100
e	1.270 TYP			b	0.350	0.400	0.450
E2	5.674	5.750	5.826				

DIMENSIONS: MILLIMETERS

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