

SuperMOS – PDFN5*6-8L -30V V_{DSS} , 8.5m Ω $R_{DS(on)}$, -39A I_D 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, $R_{DS(ON)}$ =8.5m Ω (Typ), V_{GS} =-10V
 $R_{DS(ON)}$ =12.5m Ω (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	Quantity per reel	Flammability Rating
ESN21307	PDFN5*6-8L	ESN21307/lot	Halogen free	5,000 PCS	UL 94V-0

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

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}	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 25V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.5	-2	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-20A$		8.5	12	m Ω
		$V_{GS}=-4.5V, I_D=-20A$		12.5	18	
Forward Trans conductance	g_{FS}	$V_{DS}=-5.0V, I_D=-20A$			80	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=-15V$		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	$t_{d(ON)}$	$V_{GS}=-10V, V_{DS}=-15V,$ $R_L=1\Omega, R_G=3\Omega$		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}	$V_{GS}=0V, I_S=-1.0A$		-0.75	-1	V

7. Typical Characteristic

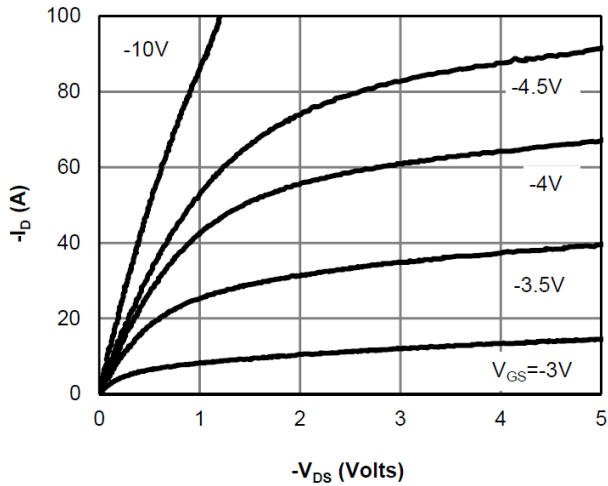


Figure 1: On-Region Characteristics

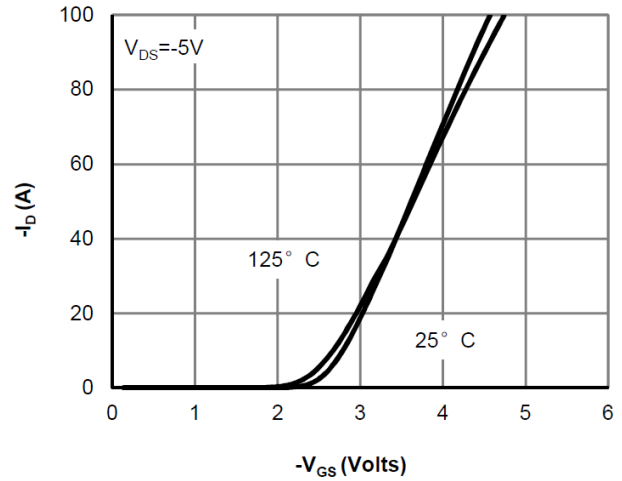


Figure 2: Transfer Characteristics

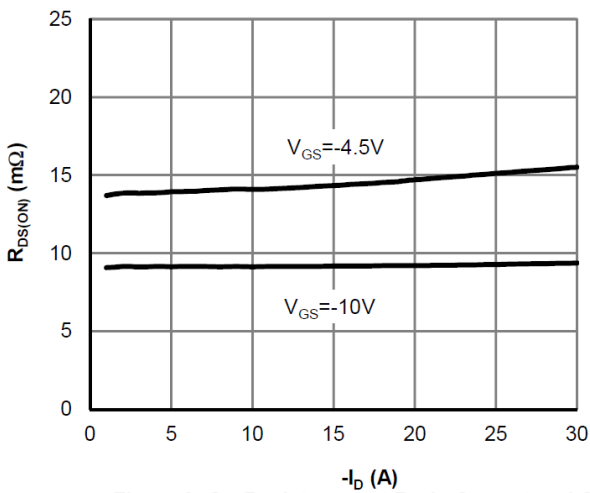


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

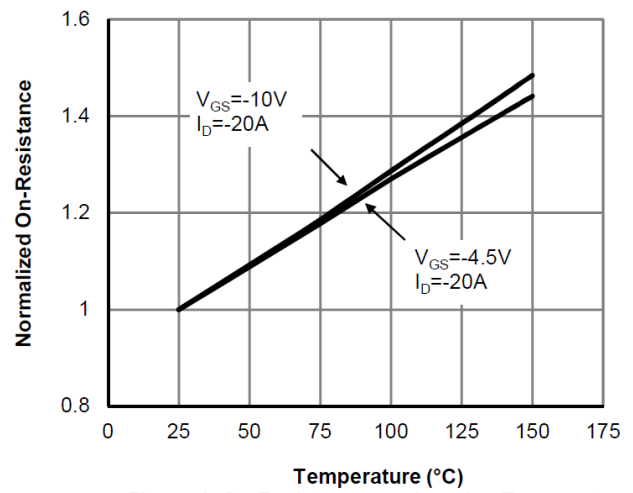


Figure 4: On-Resistance vs. Junction Temperature

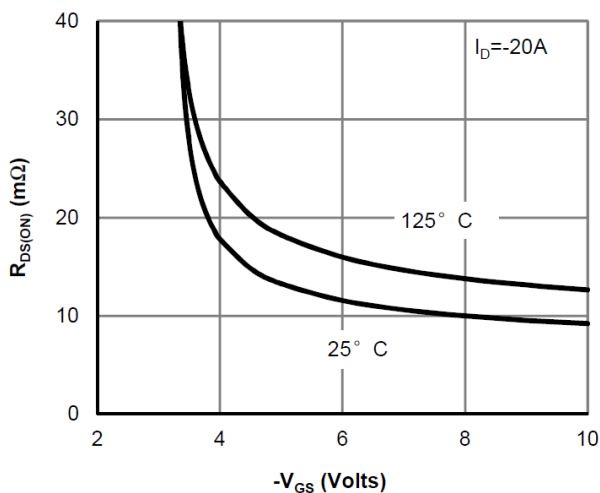


Figure 5: On-Resistance vs. Gate-Source Voltage

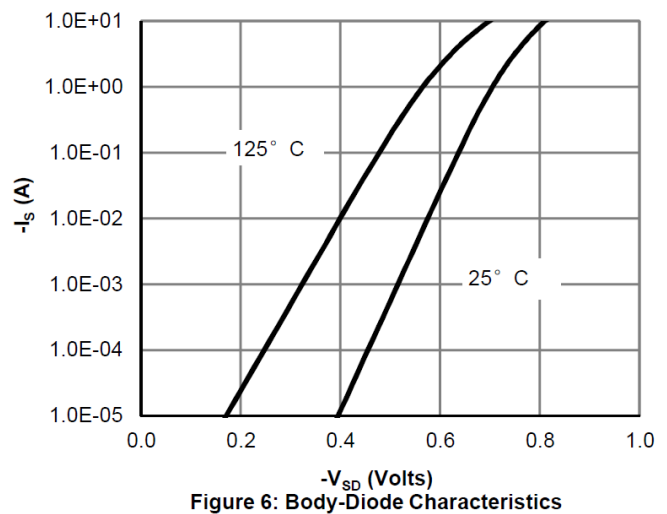


Figure 6: Body-Diode Characteristics

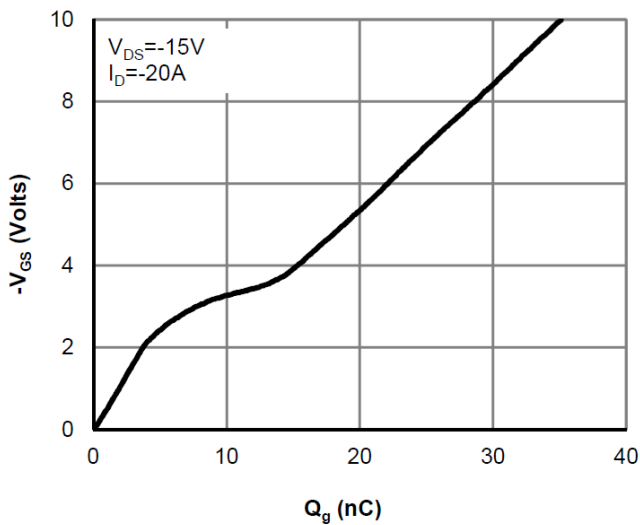


Figure 7: Gate-Charge Characteristics

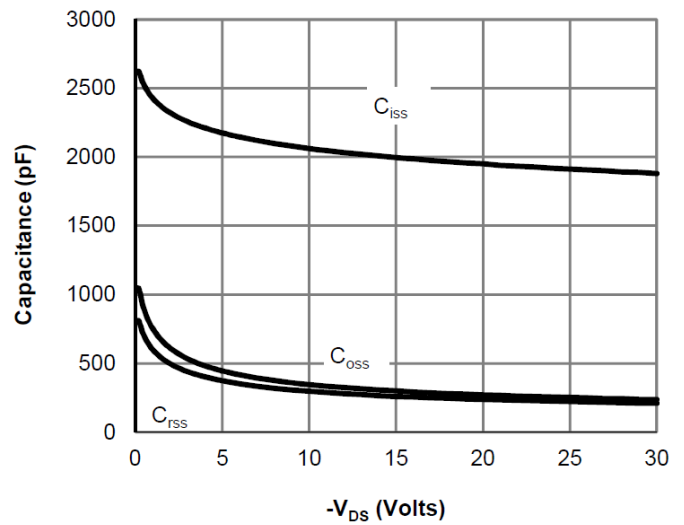


Figure 8: Capacitance Characteristics

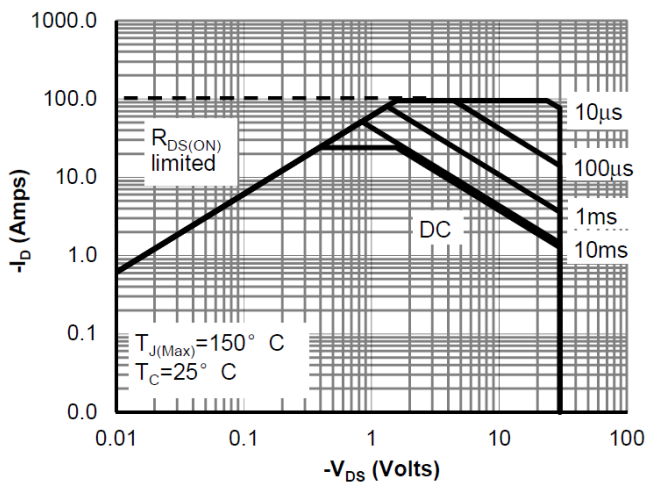


Figure 9: Maximum Forward Biased Safe Operating Area

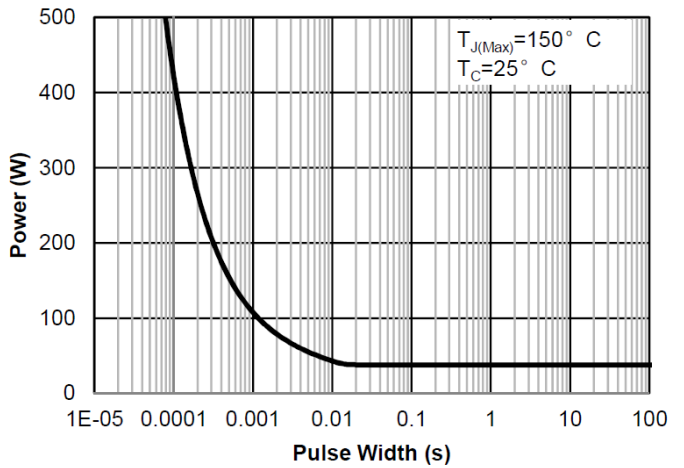


Figure 10: Single Pulse Power Rating Junction-to-Case

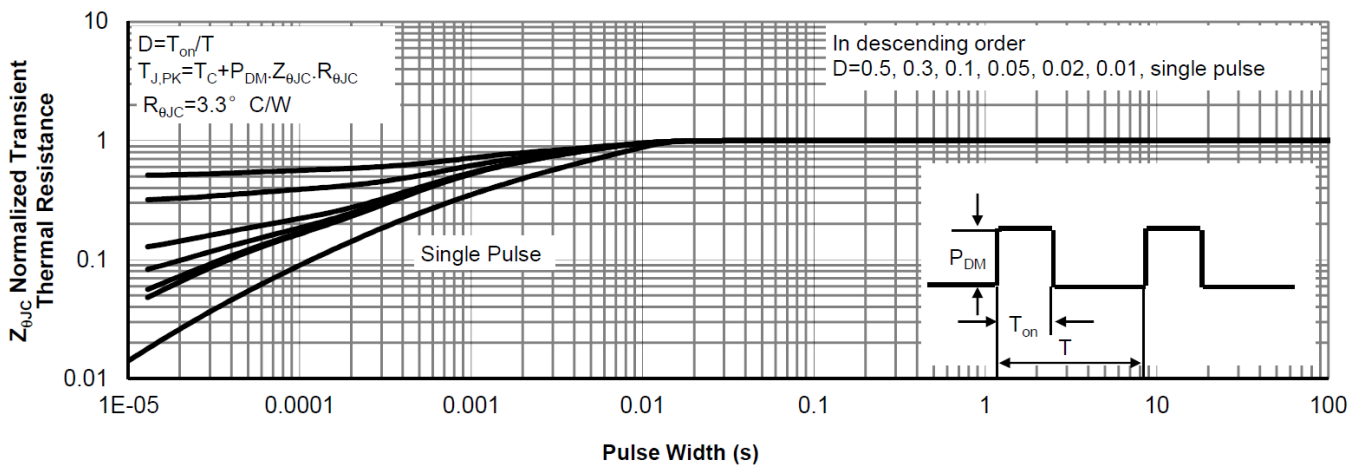
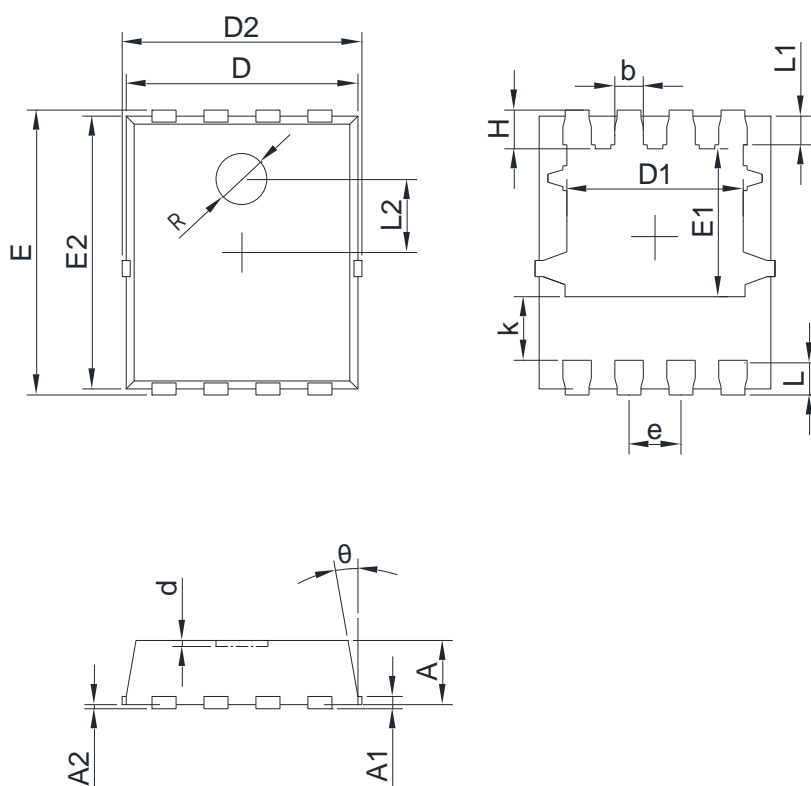


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension and Patterns (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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