SuperMOS – PDFN5*6-8L -30V BV_{DSS},8.5mΩ $R_{DS(on)}$,-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, $R_{DS(ON)}$=8.5mΩ(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

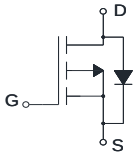
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED!

4. Ordering Information

Part Number	Package	Marking	Material	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 ℃ 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°C	I_D	-45	A
	T_C=75°C		-35	
Maximum Power Dissipation	T_C=25°C	P_D	38	W
	T_C=75°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 ≤ 10 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, tp=10μs, Duty Cycle=1%

b: EAS condition：Tj=25℃,V_{DD}=-30V,V_G=-10V,L=0.3mH,Rg=25Ω

Electrical Characteristics

At TA = 25℃ 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			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=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=-1.0A		-0.75	-1	V

7. Typical Characteristic

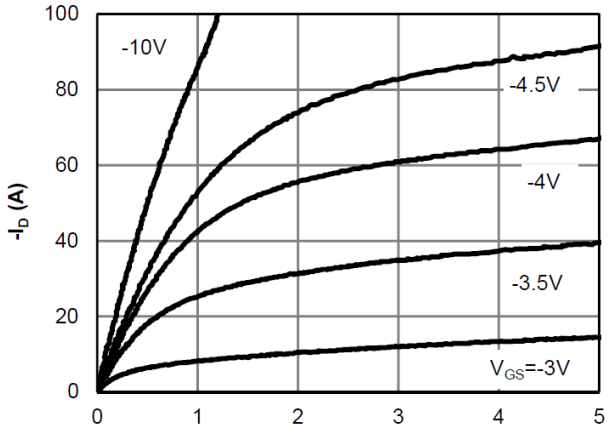


Figure 1: On-Region Characteristics

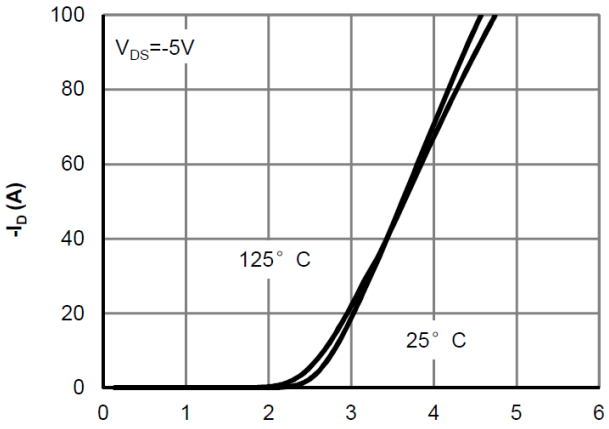


Figure 2: Transfer Characteristics

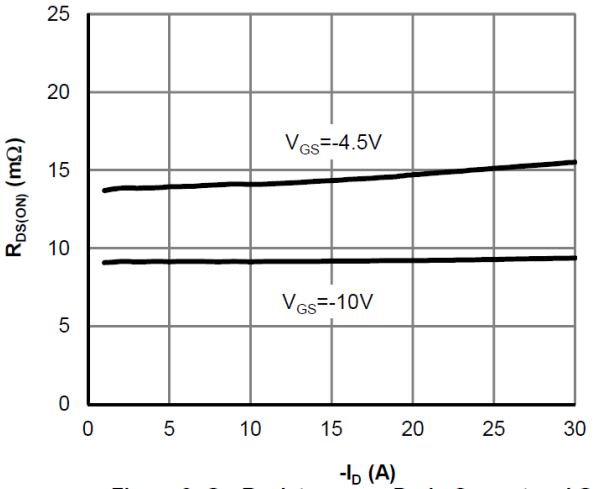


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

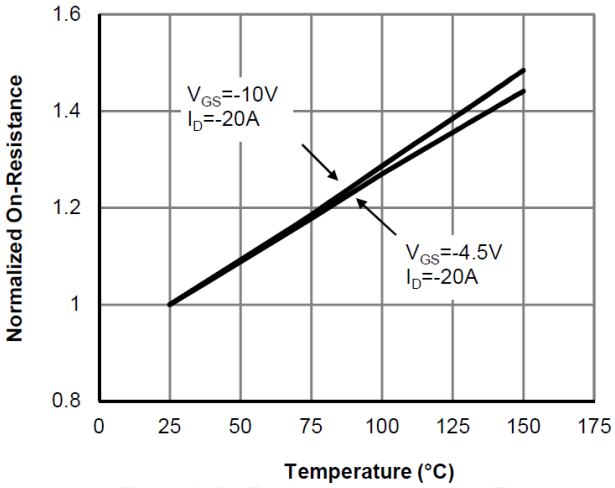


Figure 4: On-Resistance vs. Junction Temperature

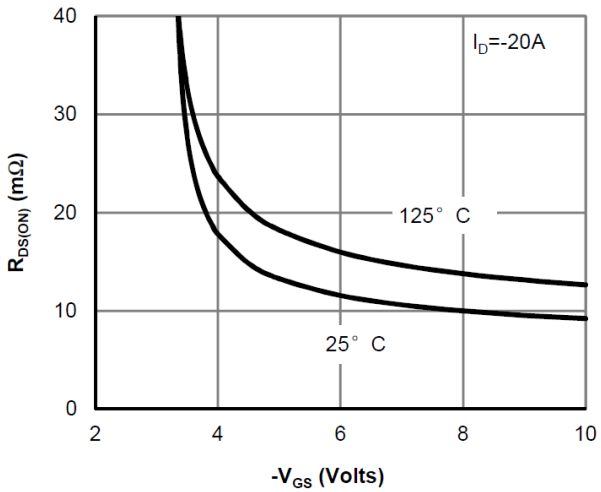


Figure 5: On-Resistance vs. Gate-Source Voltage

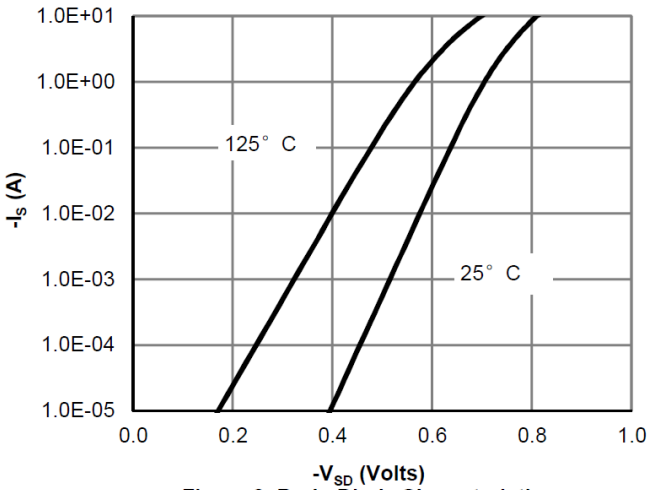


Figure 6: Body-Diode Characteristics

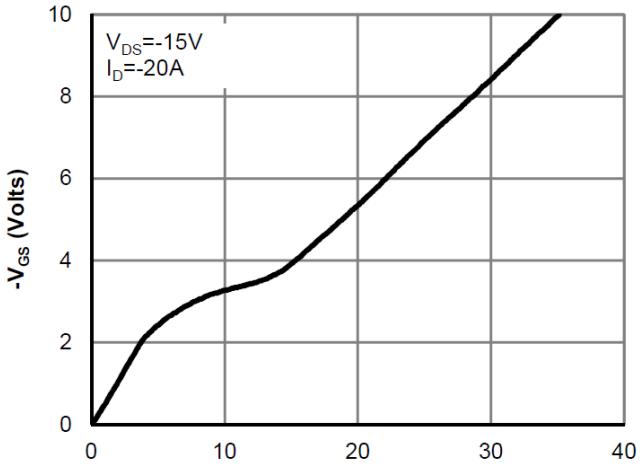


Figure 7: Gate-Charge Characteristics

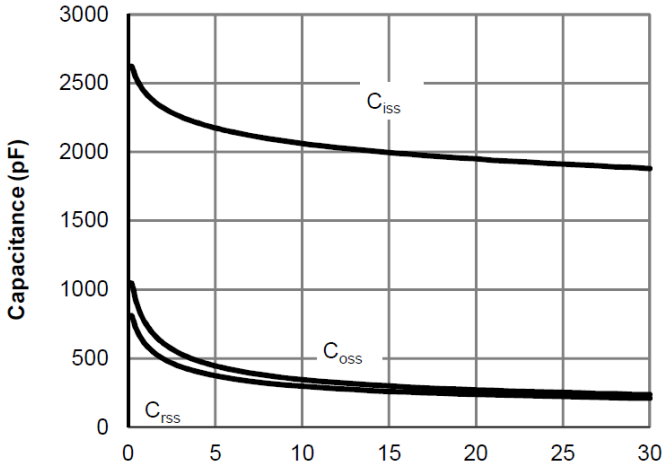
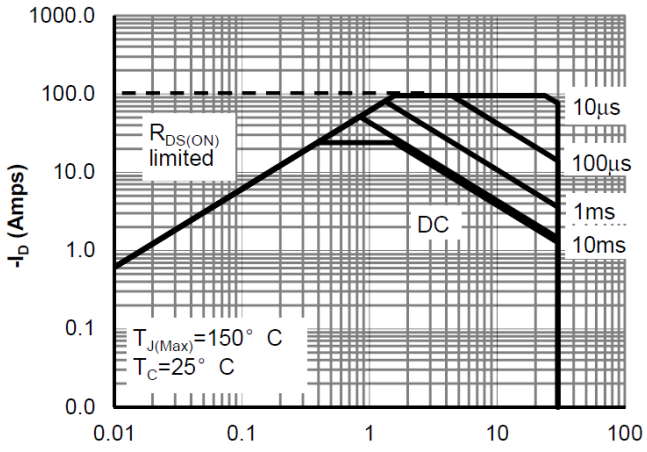


Figure 8: Capacitance Characteristics



$-V_{GS}$> or equal to -4.5V

Figure 9: Maximum Forward Biased Safe Operating Area

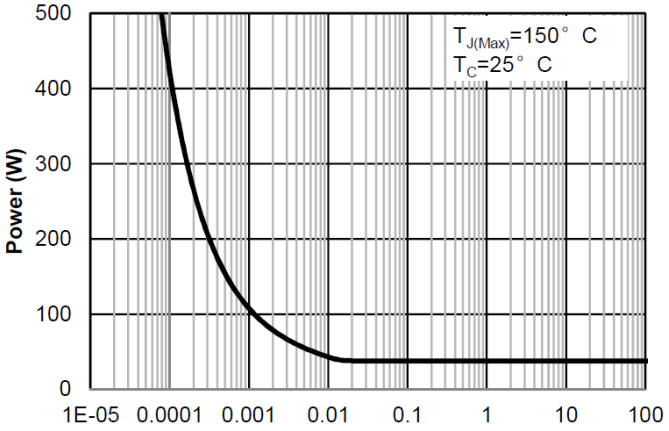


Figure 10: Single Pulse Power Rating Junction-to-Case

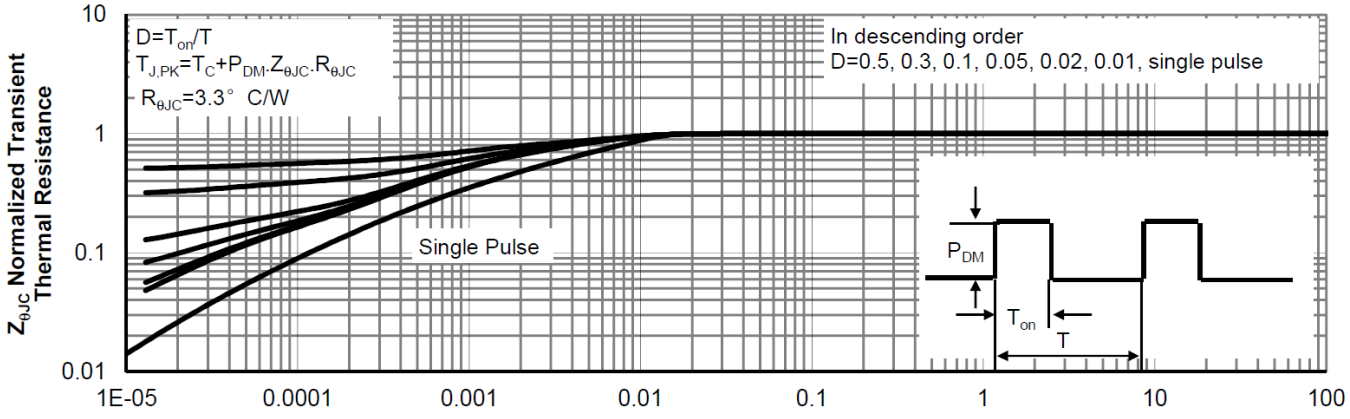
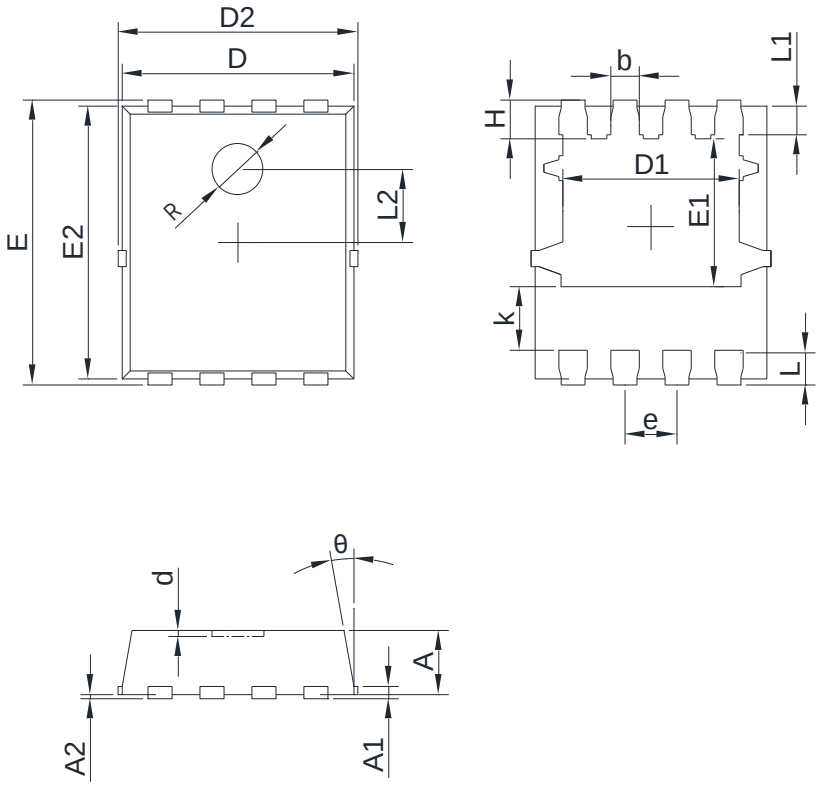


Figure 11: Normalized Maximum Transient Thermal Impedance

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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