

SuperMOS - PDFN3X3-8L -30V BV_{DSS} , 13m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The ESN7401 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 ESN7401 is Pb-free.

2. Features

- -30V, $R_{DS(on)}$ =13m Ω (TYP.) @ V_{GS} =-10V
 $R_{DS(on)}$ =17m 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

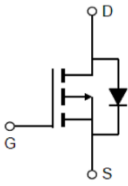
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED!

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel size
ESN7401	PDFN3X3-8L	.ESN7401/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}	±25	V
Continuous Drain Current	$T_C=25^{\circ}C$	I_D	-31	A
	$T_C=75^{\circ}C$		-24	
Maximum Power Dissipation	$T_C=25^{\circ}C$	P_D	30	W
	$T_C=75^{\circ}C$		18	
Pulsed Drain Current ^a		I_{DM}	-124	A
Operating Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{stg}	-55 to +150	°C

Thermal resistance ratings

Single Operation				
Parameter		Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10\text{ s}$	$R_{\theta JA}$	40	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	4.2	

Note:

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

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 _{GS} =0V, V _{DS} =-30V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{GS} =±25V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.5	-2.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-8A		13	20	mΩ
		V _{GS} =-4.5V, I _D =-7A		17	27	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-15V f=1MHz		1230		pF
Output Capacitance	C _{OSS}			160		
Reverse Transfer Capacitance	C _{RSS}			145		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-15V I _D =-10A		26.4		nC
Gate-to-Source Charge	Q _{GS}			6		
Gate-to-Drain Charge	Q _{GD}			4.3		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-15V R _L =1Ω, R _G =3Ω		18		ns
Rise Time	t _r			22		
Turn-Off Delay Time	t _{d(OFF)}			55		
Fall Time	t _f			42		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =-10A			-1.2	V

7. Typical Characteristic

Figure 1. On-Regin Characteristics

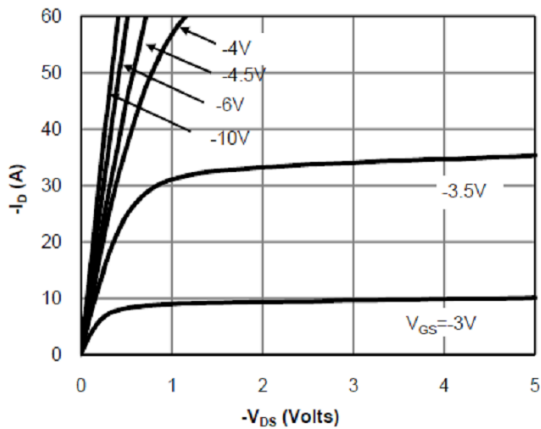


Figure 2. Transfer Characteristics

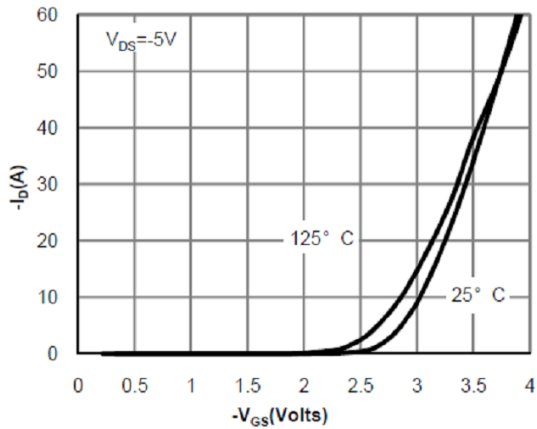


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

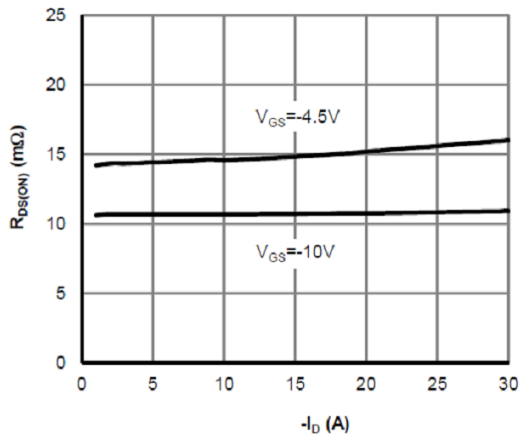


Figure 4. On-Resistance vs. Junction Temperature

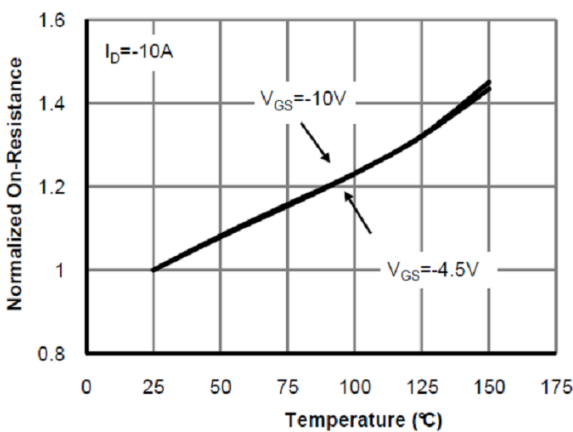


Figure 5. On-Resistance vs. Gate-Source Voltage

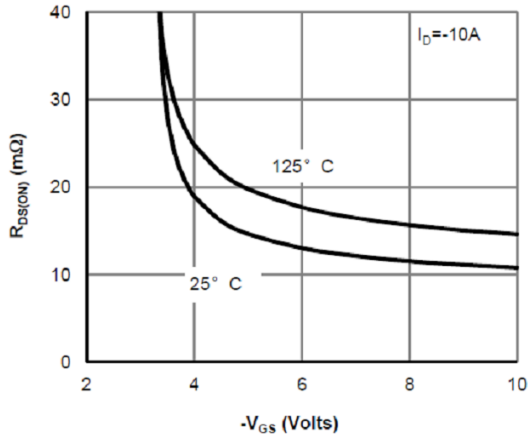


Figure 6. Body-Diode Characteristics

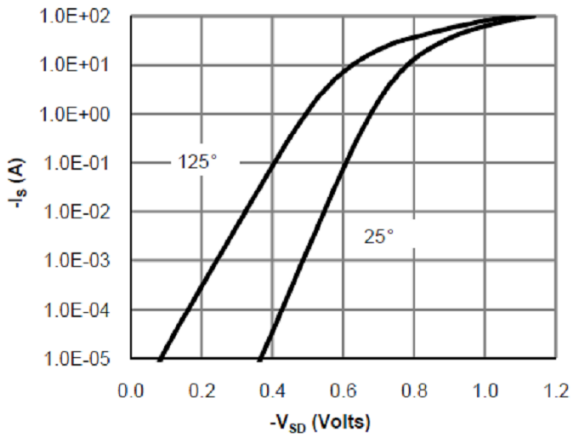


Figure 7. Gate-Charge Characteristics

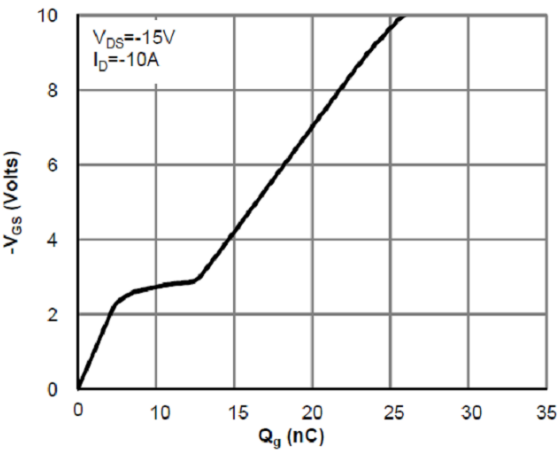


Figure 8. Capacitance Characteristics

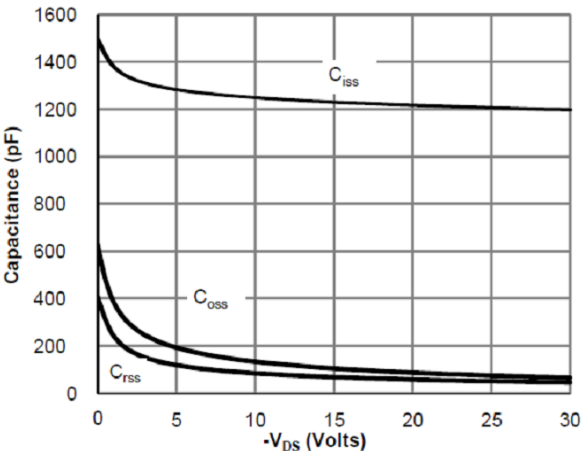


Figure 9. Maximum Forward Biased Safe Operating Area

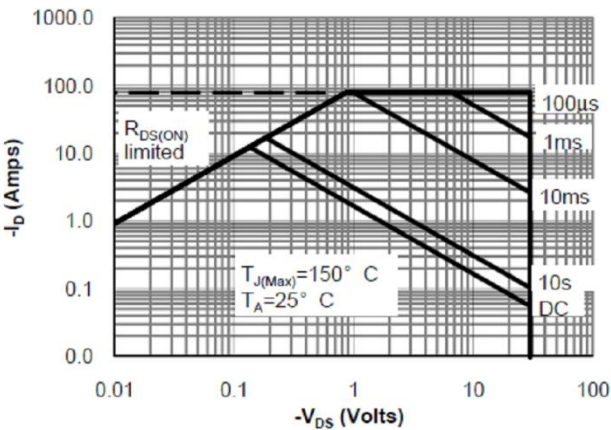
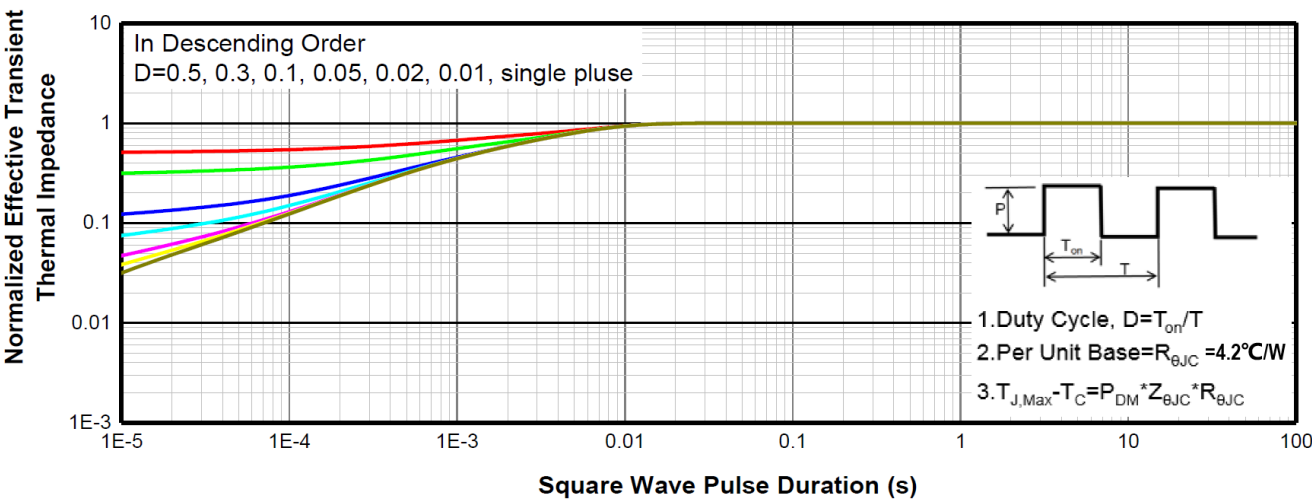
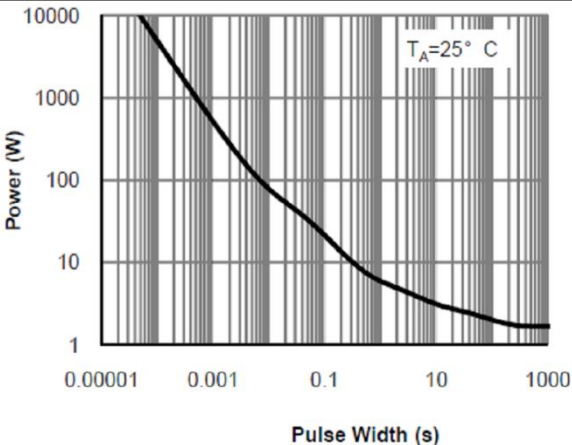
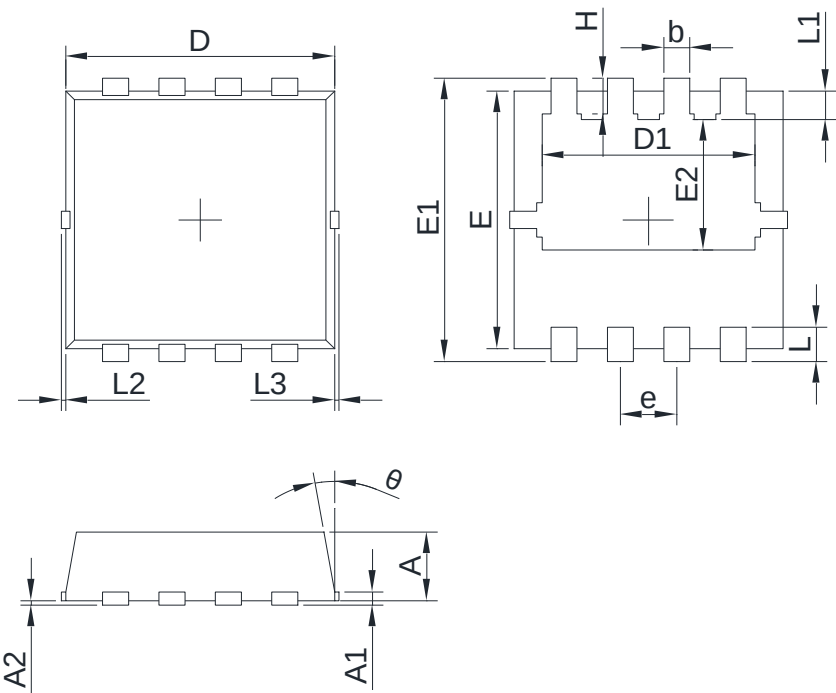


Figure 10. Single Pulse Power Rating Junction-to-Ambient



Transient Thermal Response (Junction-to-Case)

8. Dimension (PDFN3X3-8L)



Unit: mm

COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	Typ.	MAX		MIN	Typ.	MAX
A	0.700	0.800	0.900	b	0.200	0.300	0.400
A1	0.152 REF.			e	0.550	0.650	0.750
A2	0~0.05			L	0.300	0.400	0.500
D	3.000	3.100	3.200	L1	0.180	0.330	0.480
D1	2.300	2.450	2.600	L2	0~0.100		
E	2.900	3.000	3.100	L3	0~0.100		
E1	3.150	3.300	3.450	H	0.315	0.415	0.515
E2	1.320	1.520	1.720	θ	8°	10°	12°

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