

SuperMOS–PDFN5*6-8L 30V BV_{DSS}, 1.15mΩ R_{DS(on)},N-channel MOSFET

1. Description

The ESN6512 is N-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 ESN6512 is Pb-free.

2. Features

- 30V, R_{DS(ON)}=1.15mΩ(TYP.) @V_{GS}=10V
R_{DS(ON)}=1.5mΩ(TYP.) @V_{GS}=4.5V
 - Use trench MOSFET technology
 - 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
ESN6512	PDFN5*6-8L	ESN6512/lot	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

Table-1 Ordering information

5. Pin Configuration and Functions

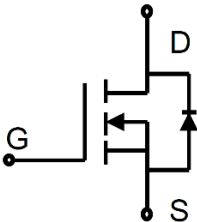
Pin	Function	Outline	Circuit Diagram
4	Gate	Note b 	
1/2/3	Source		
5/6/7/8	Drain		

Table-2 Pin configuration

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}	± 20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	120	A
	$T_C=100^{\circ}\text{C}$		78	
Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	P_D	120	W
	$T_C=100^{\circ}\text{C}$		48	
Pulsed Drain Current ^a		I_{DM}	480	A
Avalanche Current (L=0.5mH)		I_{AS}	43	A
Avalanche energy		E_{AS}	462	mJ
Operating Junction Temperature		T_J	150	$^{\circ}\text{C}$
Lead Temperature		T_L	260	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-55 to 150	$^{\circ}\text{C}$

Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Case Thermal Resistance ^a	$R_{\theta JC}$	1.04	$^{\circ}\text{C/W}$

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b: 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			1.0	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.2	1.5	2.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		1.15	1.5	mΩ
		V _{GS} =4.5V, I _D =20A		1.5	2.2	mΩ
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =20A			150	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =15V		4050		pF
Output Capacitance	C _{OSS}			1710		
Reverse Transfer Capacitance	C _{RSS}			140		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =10V, I _D =30A		68		nC
Gate-to-Source Charge	Q _{GS}			12		
Gate-to-Drain Charge	Q _{GD}			17		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =15V, I _D =50A, R _G =1Ω		18		ns
Rise Time	t _r			11		
Turn-Off Delay Time	t _{d(OFF)}			64		
Fall Time	t _f			11		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	0.45		1.2	V

7. Typical Characteristic

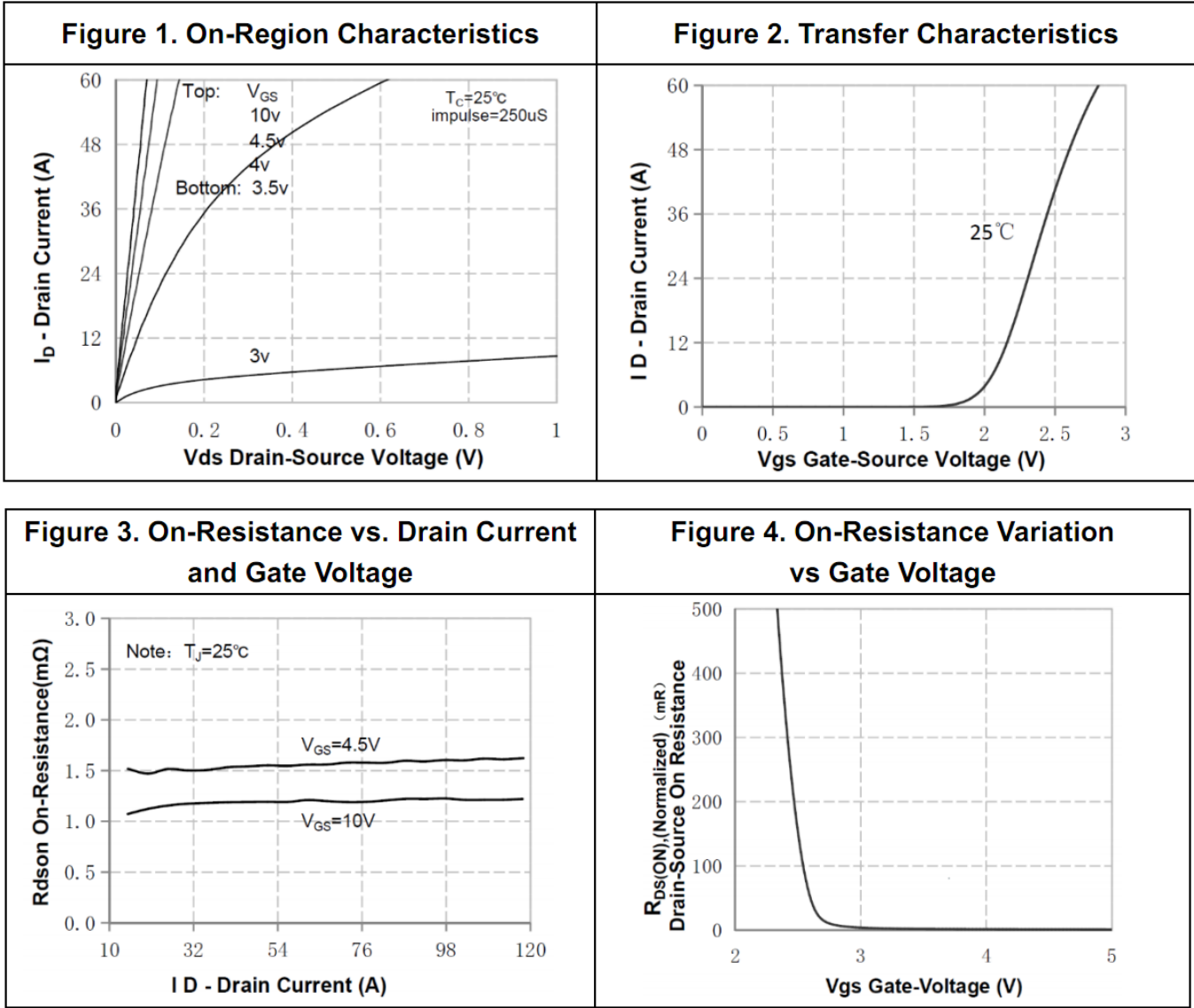


Figure 5. Capacitance Characteristics

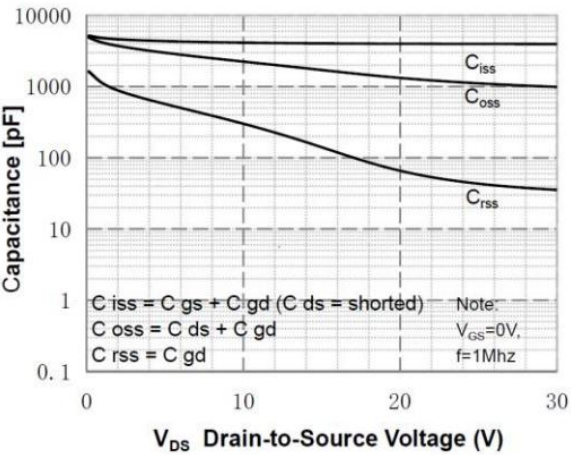


Figure 6. Body-Diode Forward Voltage Variation with Source Current and Temperature

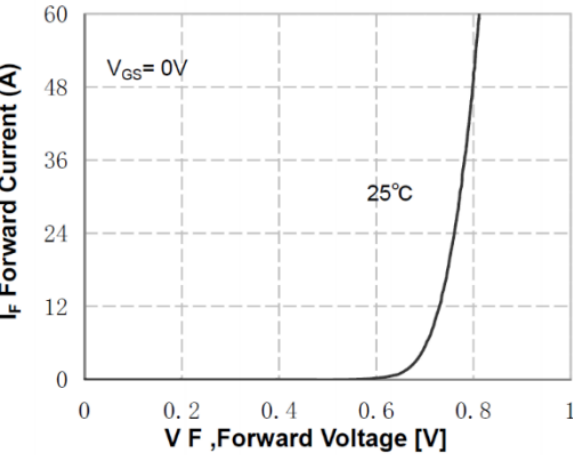
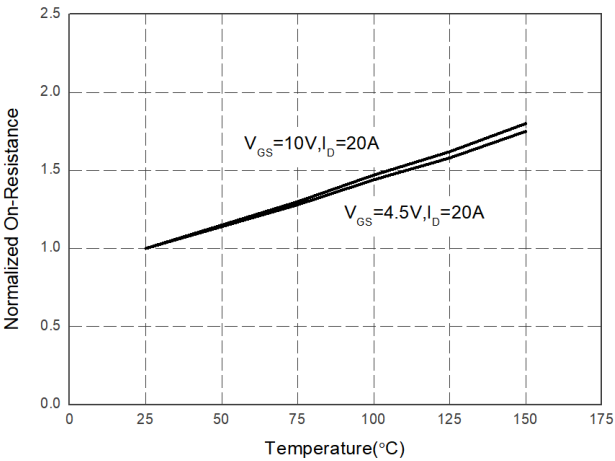
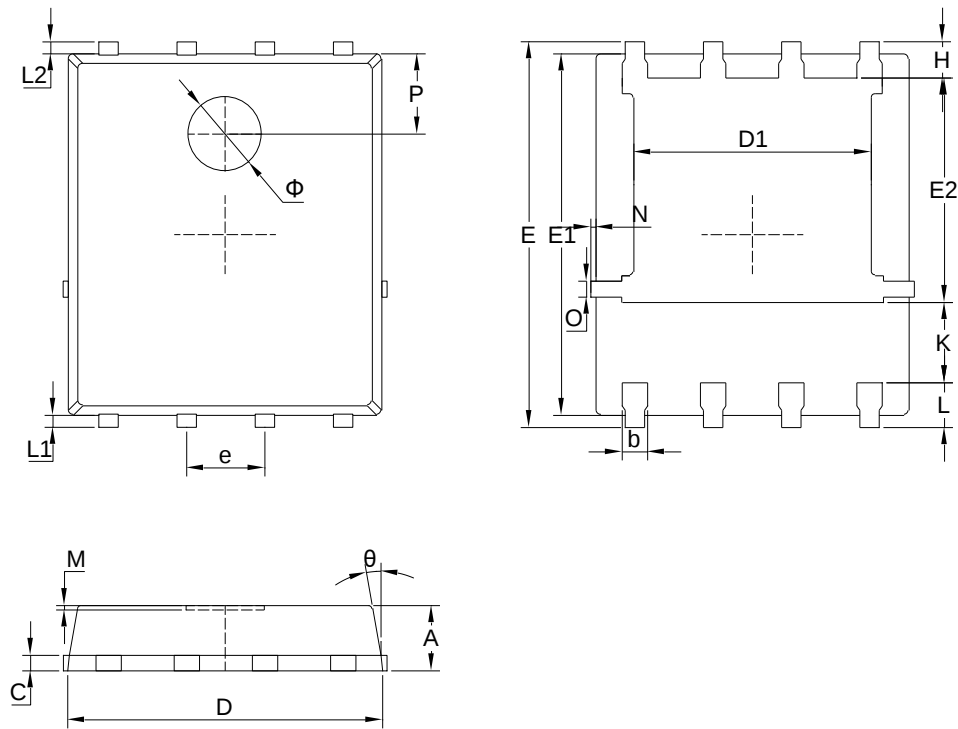


Figure 7. On-Resistance vs. Junction Temperature



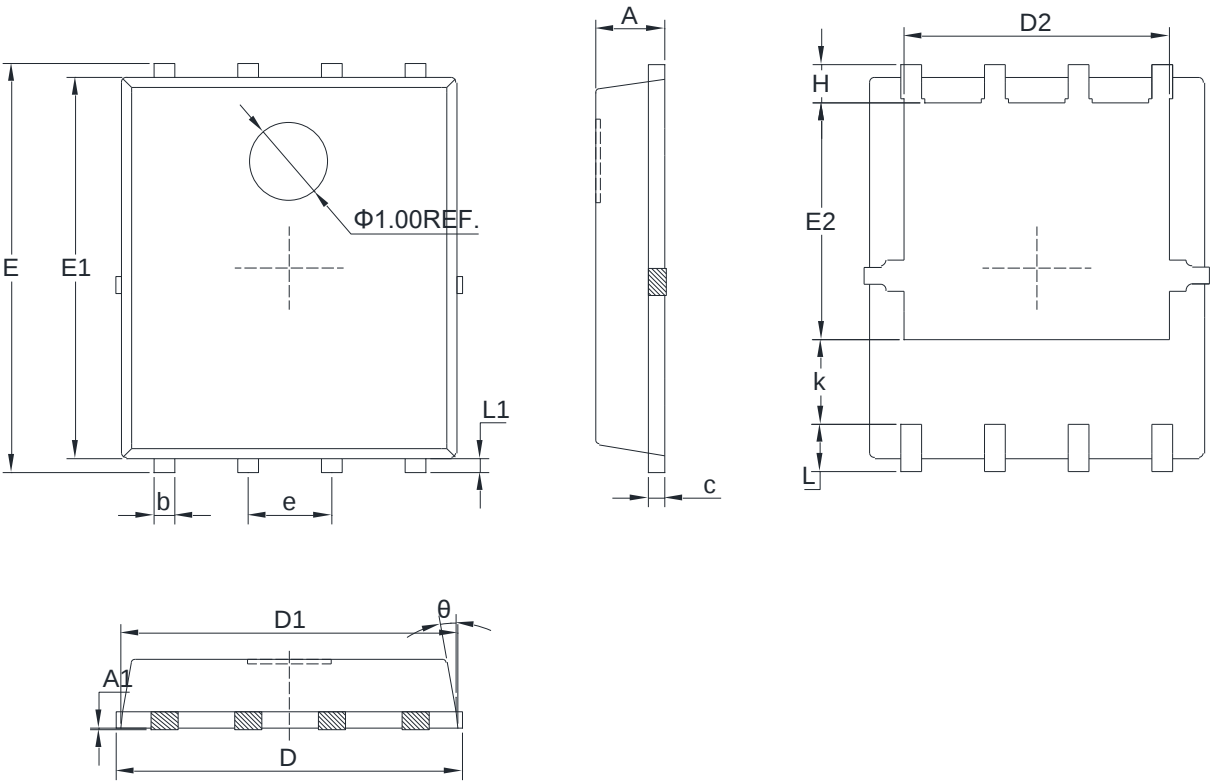
8. Dimension (PDFN5*6-8L)

POD A(J)



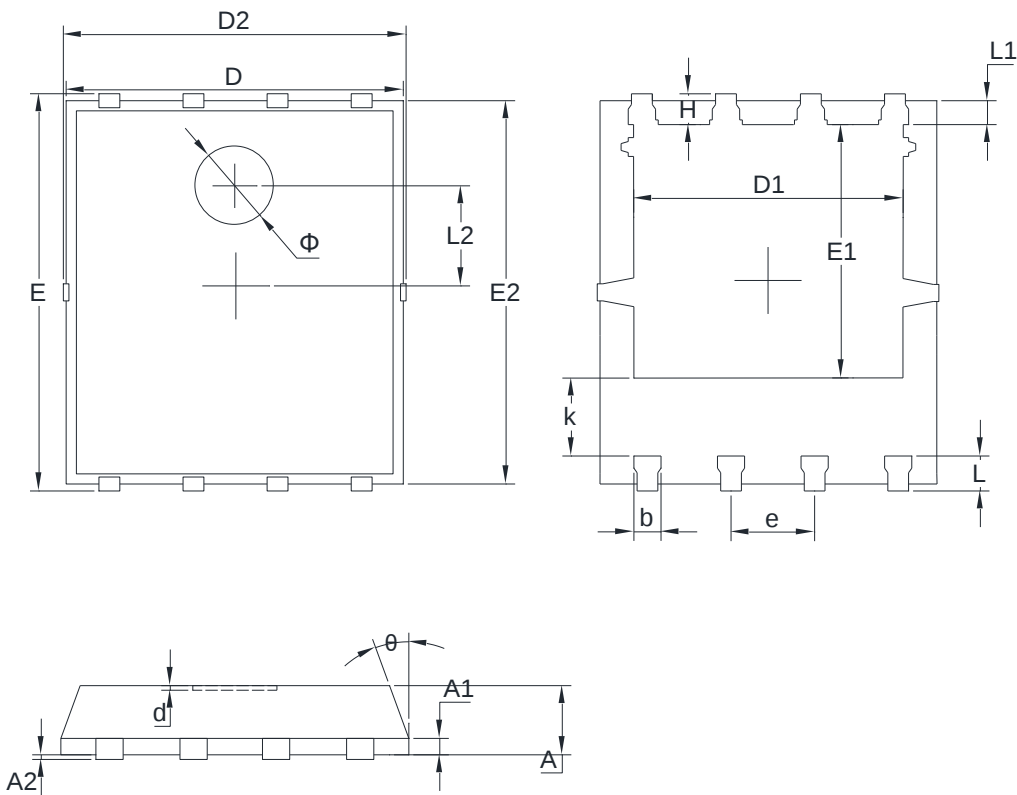
Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.90	1.05	1.20	H	0.48	0.58	0.68
b	0.35	0.40	0.50	K	1.17	1.27	1.37
C	0.20	0.25	0.35	L	0.64	0.74	0.84
D	4.90	5.05	5.20	L1/L2	0.20 REF.		
D1	3.72	3.82	3.92	θ	8°	10°	12°
E	6.00	6.15	6.30	M	0.08 REF.		
E1	5.60	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				

Technical drawing of a mechanical part, showing front and top views with dimensions.

Front View (Top):

- Overall width: 4.60
- Overall height: 6.15
- Top surface features four rectangular protrusions, each 0.50 wide and 0.635 high.
- Distance between the first and last protrusion: 0.77
- Distance from the left edge to the first protrusion: 0.50
- Distance from the last protrusion to the right edge: 0.55
- Bottom surface features four rectangular protrusions, each 0.50 wide and 0.65 high.
- Distance between the first and last protrusion: 1.27
- Distance from the left edge to the first protrusion: 0.50
- Distance from the last protrusion to the right edge: 0.55
- Overall height of the part: 4.12
- Distance from the top surface to the bottom surface: 1.60

Top View (Bottom):

- Overall width: 4.60
- Overall height: 6.15
- Top surface features four rectangular protrusions, each 0.50 wide and 0.635 high.
- Distance between the first and last protrusion: 0.77
- Distance from the left edge to the first protrusion: 0.50
- Distance from the last protrusion to the right edge: 0.55
- Bottom surface features four rectangular protrusions, each 0.50 wide and 0.65 high.
- Distance between the first and last protrusion: 1.27
- Distance from the left edge to the first protrusion: 0.50
- Distance from the last protrusion to the right edge: 0.55
- Overall height of the part: 4.12
- Distance from the top surface to the bottom surface: 1.60

DIMENSIONS: MILLIMETERS

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