SuperMOS–PDFN5*6-8L 30V BV_{DSS} 1.15mΩ $R_{DS(on)}$ 120A I_D,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

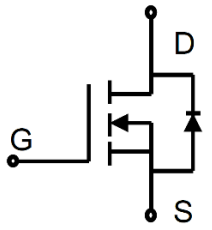
Pin	Function	Outline	Circuit Diagram
4	Gate		
1/2/3	Source		
5/6/7/8	Drain		

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°C	I_D	120	A
	T_C=100°C		78	
Maximum Power Dissipation	T_C=25°C	P_D	120	W
	T_C=100°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	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

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

Note:

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

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			1.0	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, ID=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 1. On-Region Characteristics

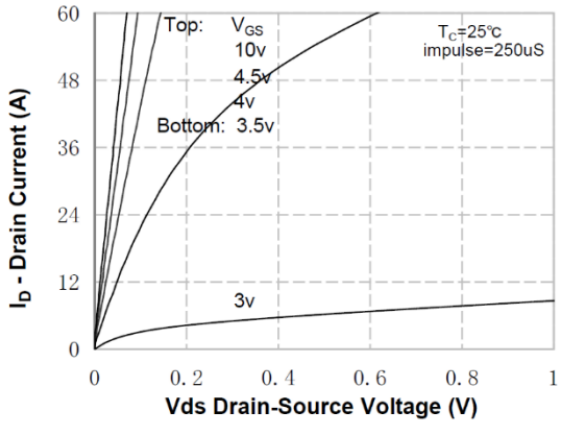


Figure 2. Transfer Characteristics

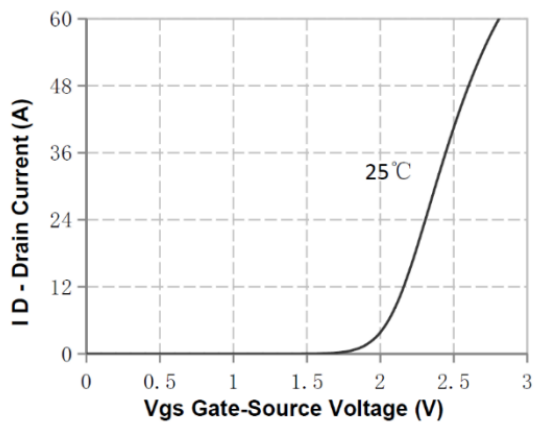


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

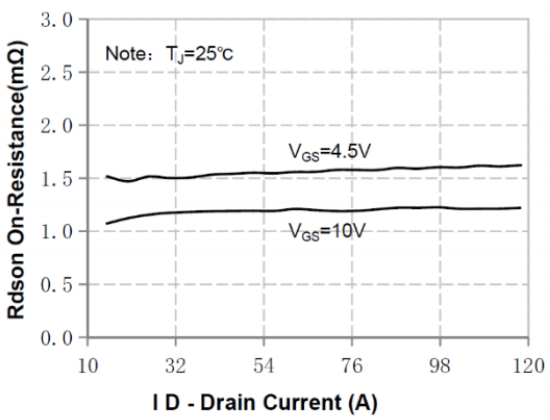


Figure 4. On-Resistance Variation vs Gate Voltage

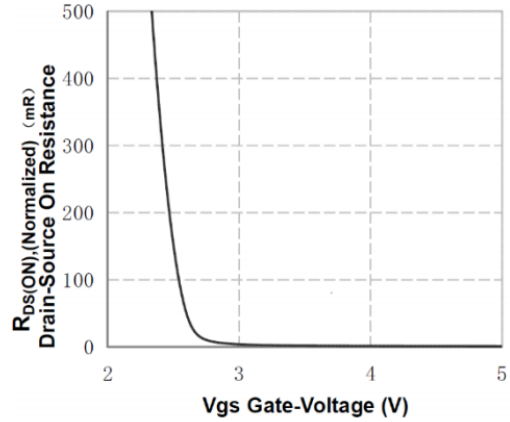


Figure 5. Breakdown Voltage Variation vs Gate Voltage

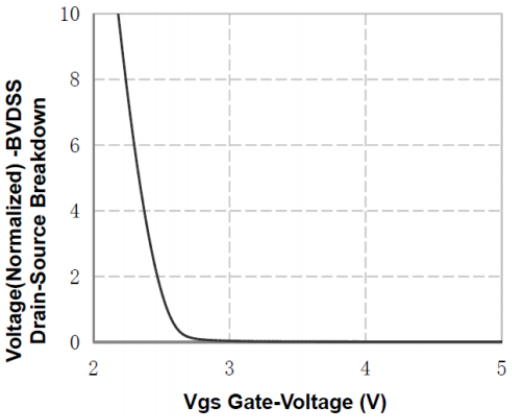


Figure 6. Body-Diode Forward Voltage Variation with Source Current and Temperature

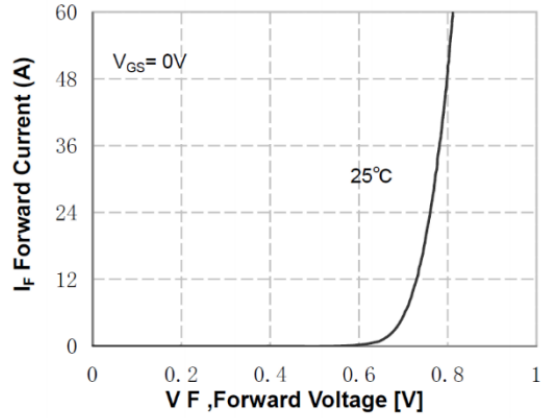


Figure 7. Gate-Charge Characteristics

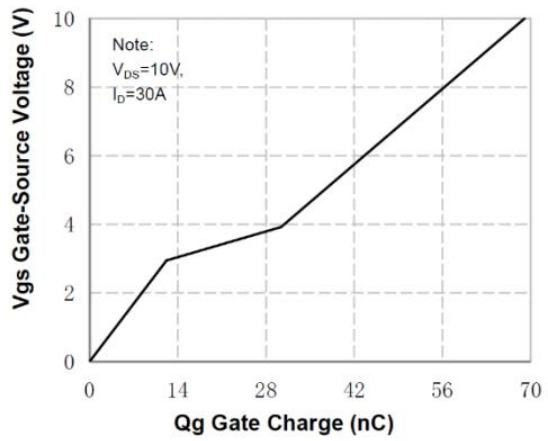


Figure 8. Capacitance Characteristics

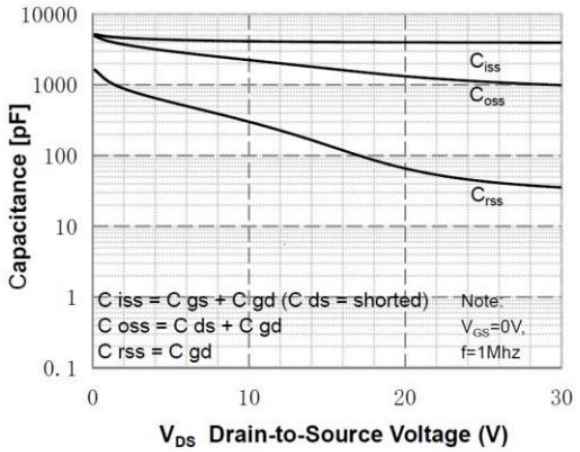


Figure 9. Maximum Forward Biased Safe Operating Area

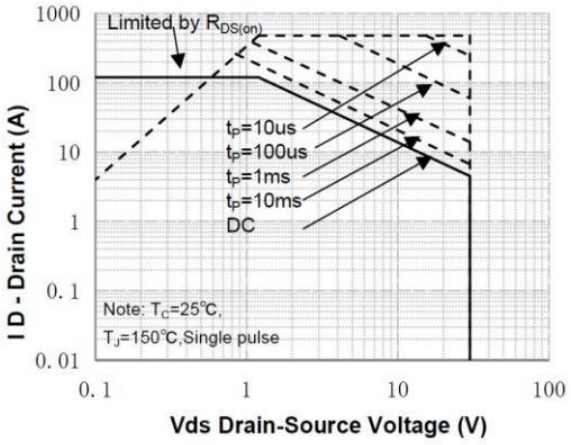


Figure 10. Maximun PContinuous Drain Currentvs Case Temperature

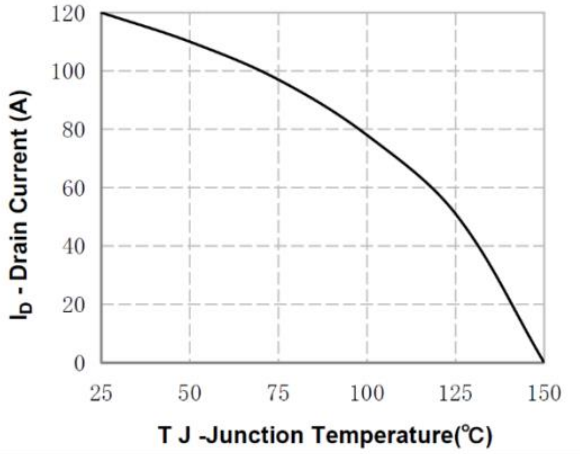
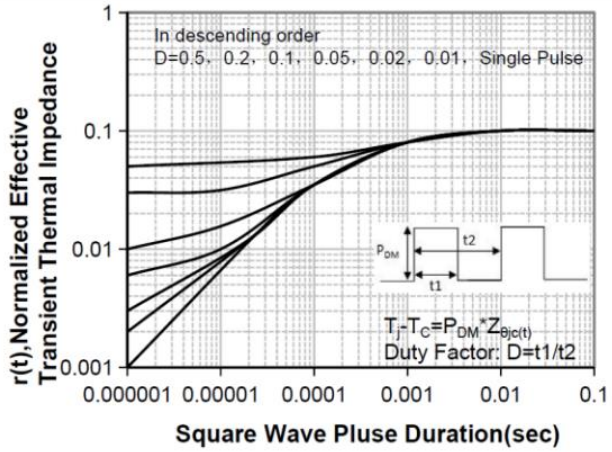
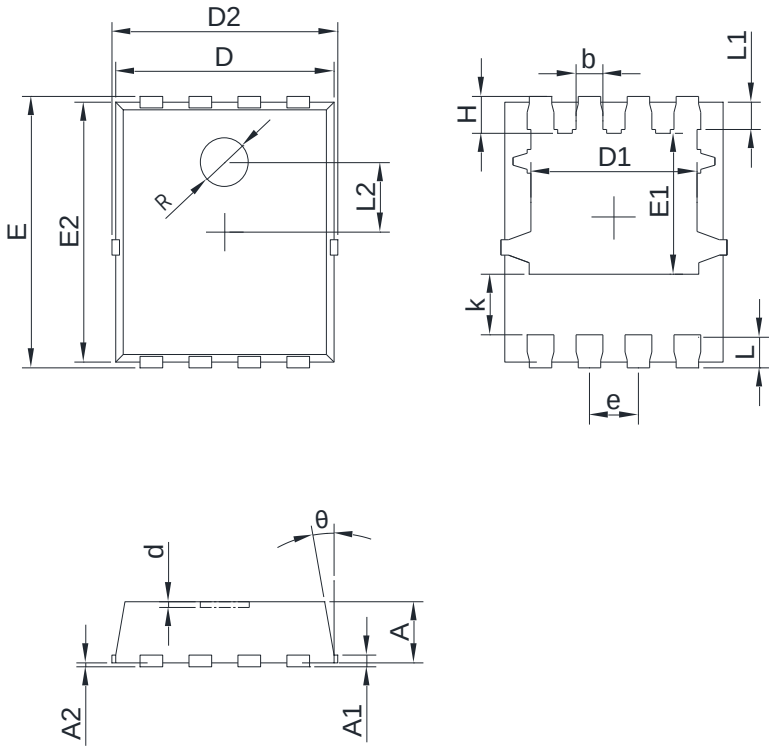


Figure 11. Normalized Maximum Transient Thermal Impedance



8. Dimension (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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