

**SuperMOS –PDFN5\*6-8L 30V  $BV_{DSS}$  10m $\Omega$   $R_{DS(on)}$  32A  $I_D$ , N-channel MOSFET**

**1. Description**

The ESN6204 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 ESN6204 is Pb-free.

**2. Features**

- 30V,  $R_{DS(ON)}=10m\Omega(Typ)$ ,  $V_{GS}=10V$   
 $R_{DS(ON)}=13.5m\Omega(Typ)$ ,  $V_{GS}=4.5V$
- 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
ESN6204	PDFN5*6-8L	ESN6204/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
1/2/3	Source		
4	Gate		
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	$T_C=25^{\circ}C$	$I_D$	32	A
	$T_C=75^{\circ}C$		24	
Maximum Power Dissipation	$T_C=25^{\circ}C$	$P_D$	31	W
	$T_C=75^{\circ}C$		19	
Pulsed Drain Current		$I_{DM}$	120	A
Avalanche Current, Single Pulsed <sup>a</sup>		$I_{AS}$	17	A
Avalanche Energy, Single Pulsed <sup>a</sup>		$E_{AS}$	43.4	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	Maximum	Unit
Junction-to-Case Thermal Resistance	$t \leq 10$ s	$R_{\theta JC}$	3.3	4	°C/W

Note:

a: EAS condition:  $T_J=25^{\circ}C, V_{DD}=30V, V_G=10V, L=0.3mH, R_g=25\Omega$

## Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1.0	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.5	2.4	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		10	19	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$		13.5	26	
Forward Trans conductance	$g_{FS}$	$V_{DS}=5.0V, I_D=20A$			50	S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz, V_{DS}=15V$		512		pF
Output Capacitance	$C_{OSS}$			225		
Reverse Transfer Capacitance	$C_{RSS}$			22		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=15V, I_D=20A$		8		nC
Gate-to-Source Charge	$Q_{GS}$			2		
Gate-to-Drain Charge	$Q_{GD}$			1.5		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=15V, R_L=1.5\Omega, R_{GEN}=3\Omega$		4.4		ns
Rise Time	$t_r$			7.9		
Turn-Off Delay Time	$t_{d(OFF)}$			15.6		
Fall Time	$t_f$			3.5		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.0A$	0.45		1.2	V

## 7. Typical Characteristic

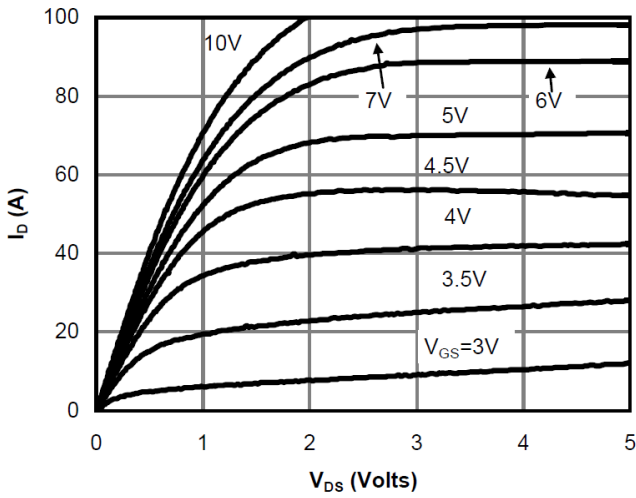


Fig 1: On-Region Characteristics

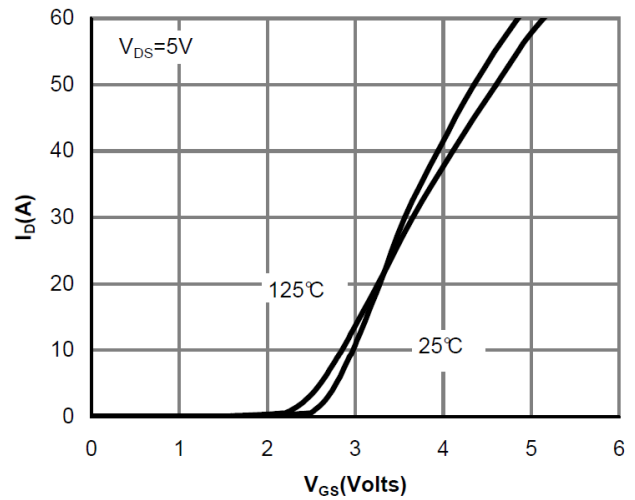


Figure 2: Transfer Characteristics

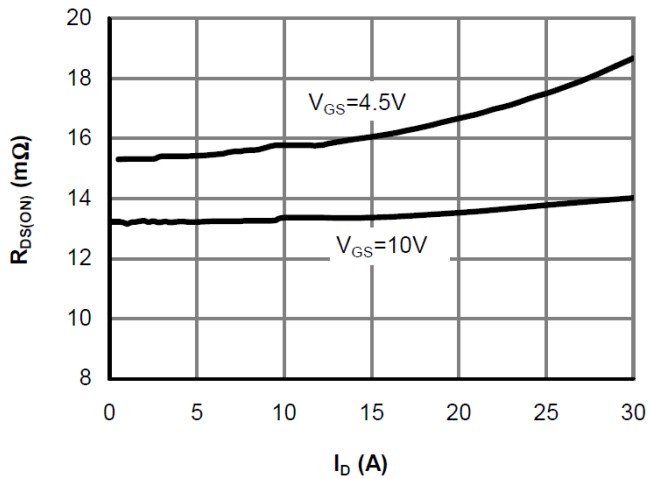


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

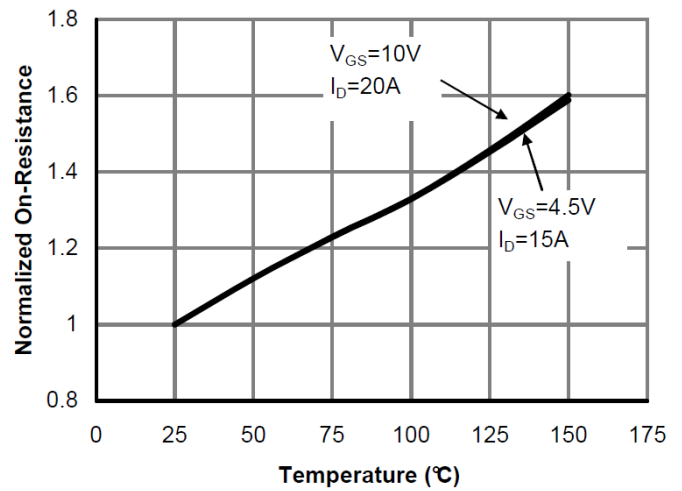


Figure 4: On-Resistance vs. Junction Temperature

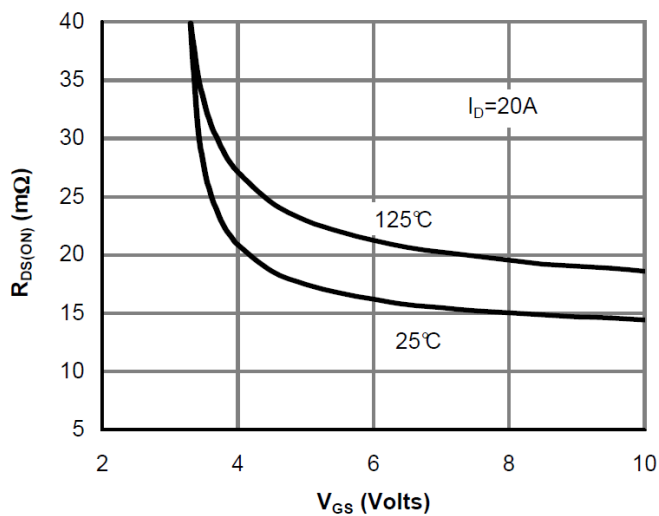


Figure 5: On-Resistance vs. Gate-Source Voltage

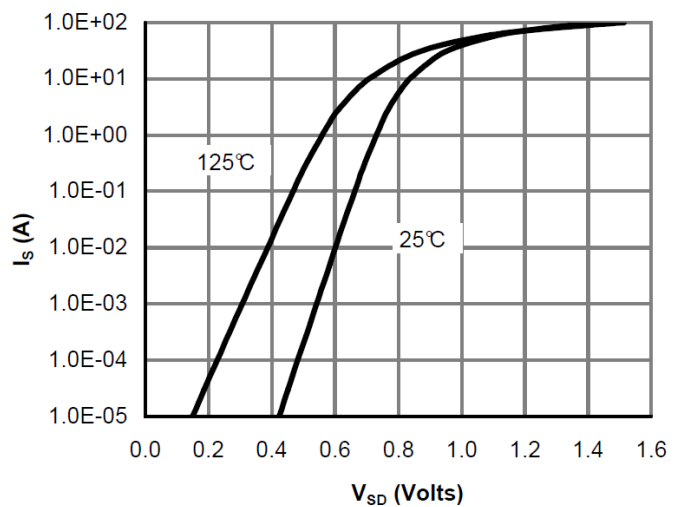
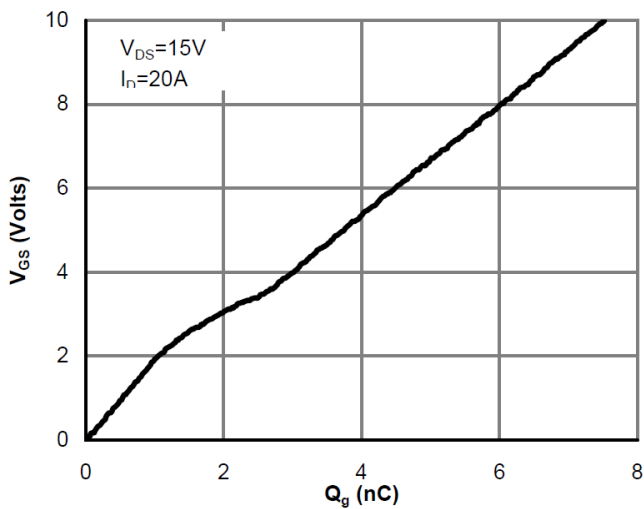
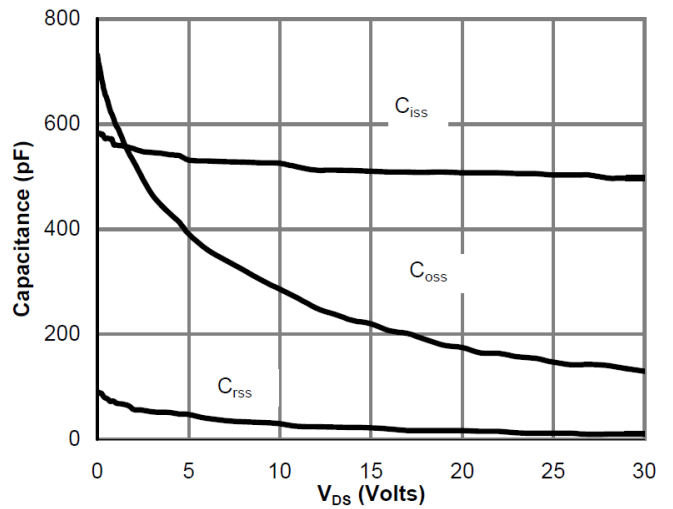


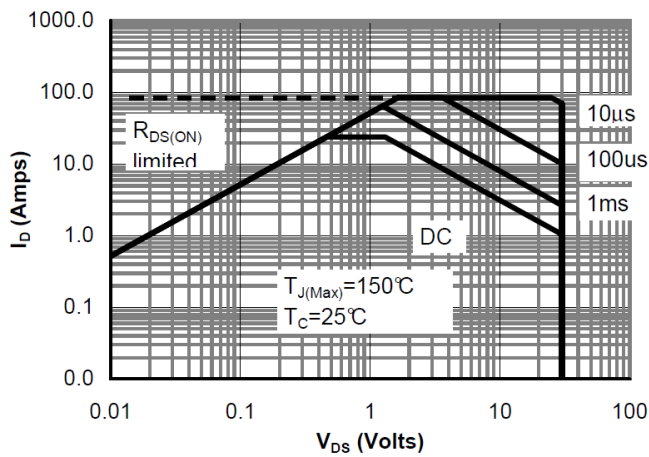
Figure 6: Body-Diode Characteristics



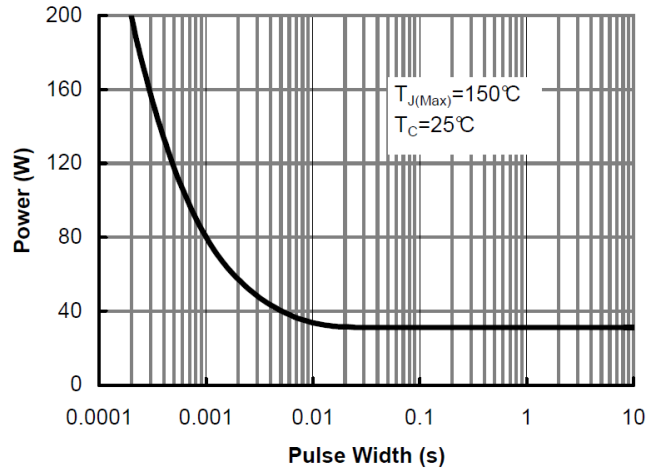
**Figure 7: Gate-Charge Characteristics**



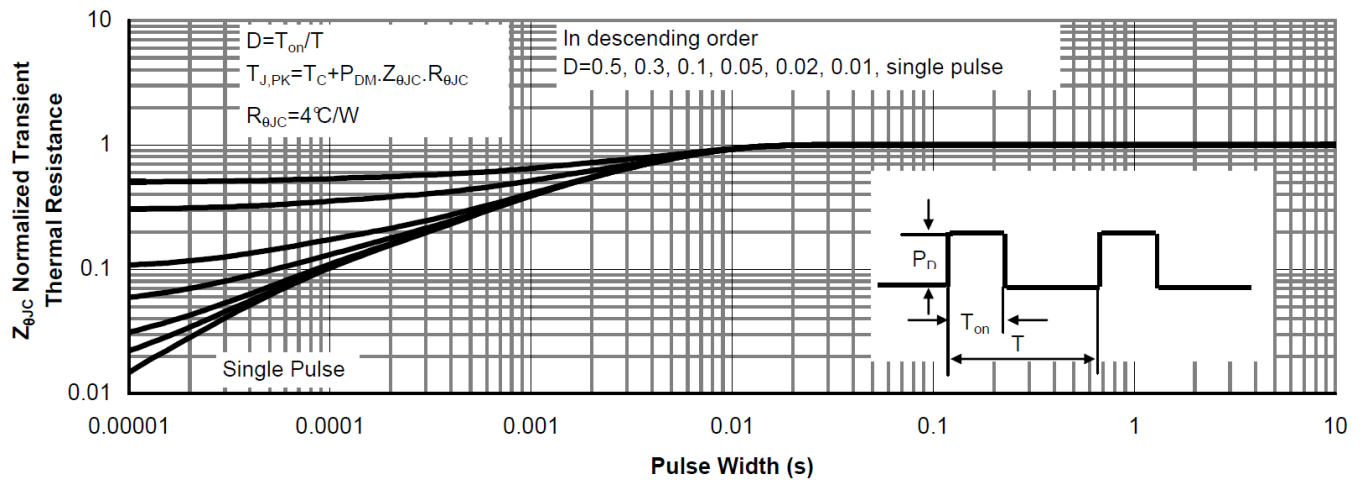
**Figure 8: Capacitance Characteristics**



**Figure 9: Maximum Forward Biased Safe Operating Area**

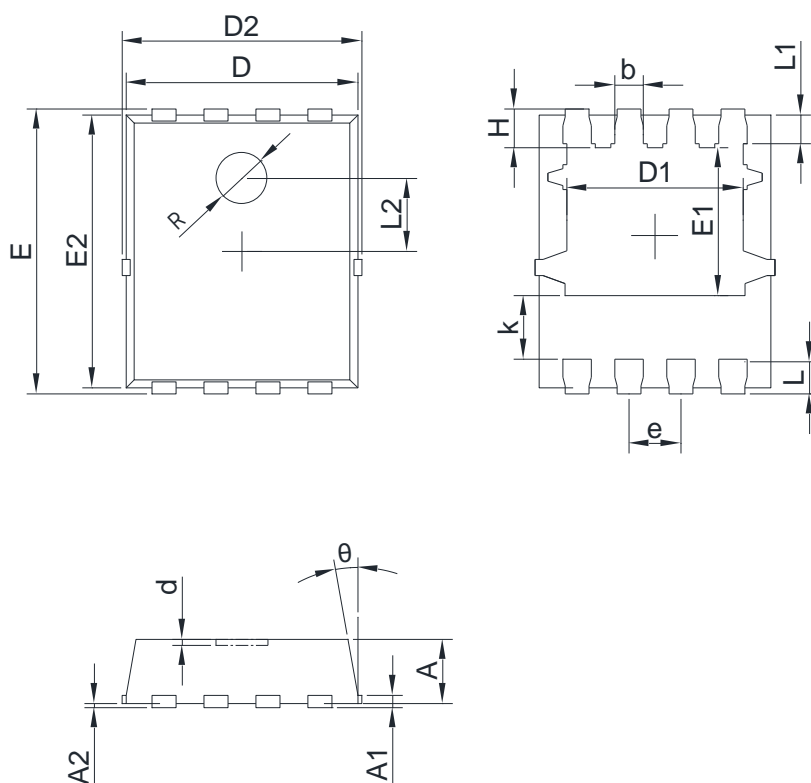


**Figure 10: Single Pulse Power Rating Junction-to-Case**



**Figure 11: Normalized Maximum Transient Thermal Impedance**

8. Dimension (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	theta	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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