

**SuperMOS – SOT23-3L 100V BV<sub>DSS</sub>, 90mΩ R<sub>DS(ON)</sub>, N-channel MOSFET**

**1. Description**

The ES5N10A is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ES5N10A is Pb-free.

**2. Features**

- 100V, R<sub>DS(ON)</sub>=90mΩ(TYP.) @V<sub>GS</sub>=10V
- R<sub>DS(ON)</sub>=120mΩ(TYP.) @V<sub>GS</sub>=4.5V
- Use trench MOSFET technology
- High density cell design for low R<sub>DS(on)</sub>
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current


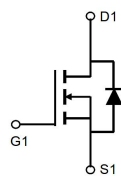
**3. Applications**

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

**4. Ordering Information**

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ES5N10A	SOT23-3L	ES5N10A	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

**5. Pin Configuration and Functions**

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$BV_{DSS}$	100	V	
Gate-Source Voltage	$V_{GS}$	±20	V	
Continuous Drain Current	$I_D$	$T_A=25^{\circ}C$	2.6	A
		$T_A=75^{\circ}C$	2	
Maximum Power Dissipation	$P_D$	1.4	W	
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	10.4	A	
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-Ambient Thermal Resistance <sup>B</sup>	$R_{\theta JA}$		90	°C/W

Note:

A. Pulse Test: Pulse Width ≤ 300us, Duty cycle ≤ 2%.

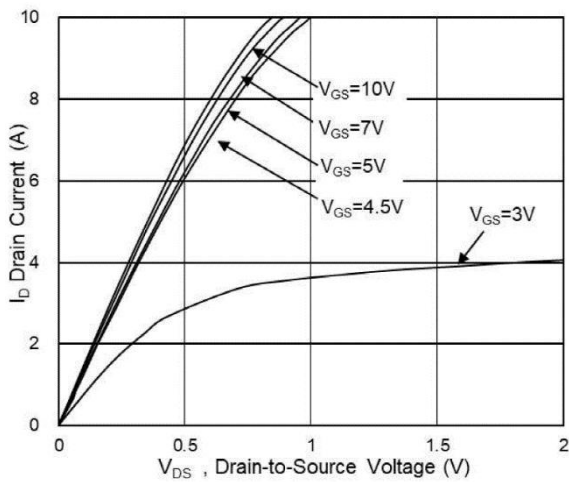
B. Device mounted on FR-4 PCB, 1 inch x 0.85inch x 0.062 inch.

## Electrical Characteristics

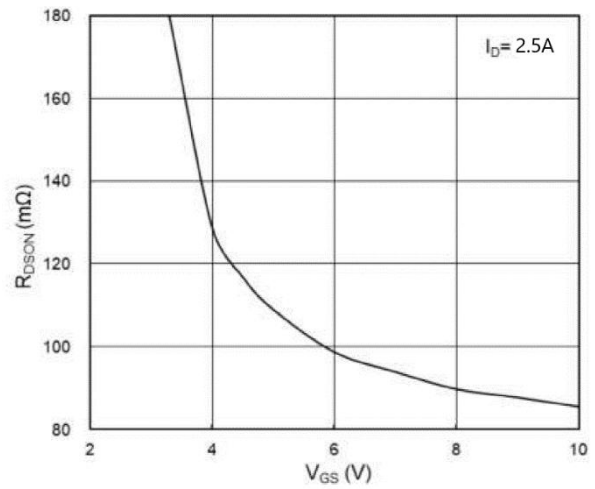
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$			1	$\mu A$
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	1.65	2.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.5A$		90	135	m $\Omega$
		$V_{GS}=4.5V, I_D=2A$		120	195	
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz, V_{DS}=25V$		206		pF
Output Capacitance	$C_{OSS}$			29		
Reverse Transfer Capacitance	$C_{RSS}$			1.4		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=25V, I_D=2.5A$		4.2		nC
Gate-to-Source Charge	$Q_{GS}$			1.5		
Gate-to-Drain Charge	$Q_{GD}$			1.1		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=25V, I_D=2.5A, R_G=2\Omega$		14.7		ns
Rise Time	$t_r$			3.5		
Turn-Off Delay Time	$t_{d(OFF)}$			20.9		
Fall Time	$t_f$			2.7		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.0A$		0.8	1.5	V

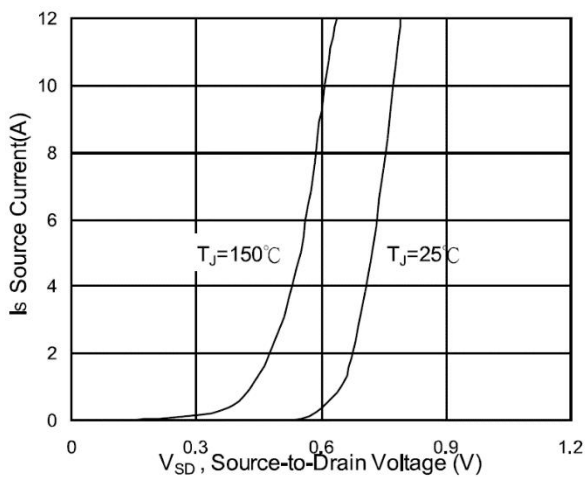
**7. Typical Characteristic**



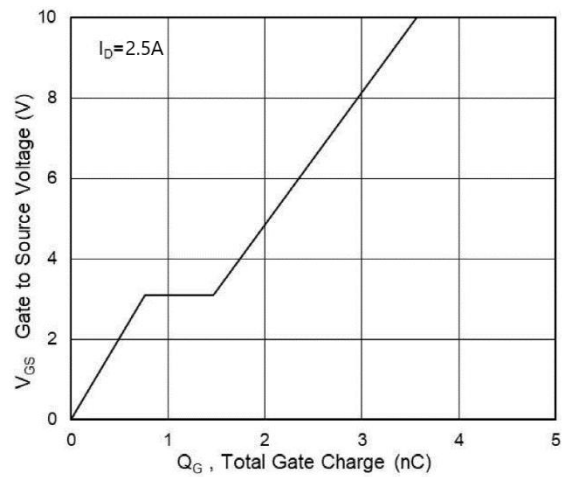
**Fig.1 Typical Output Characteristics**



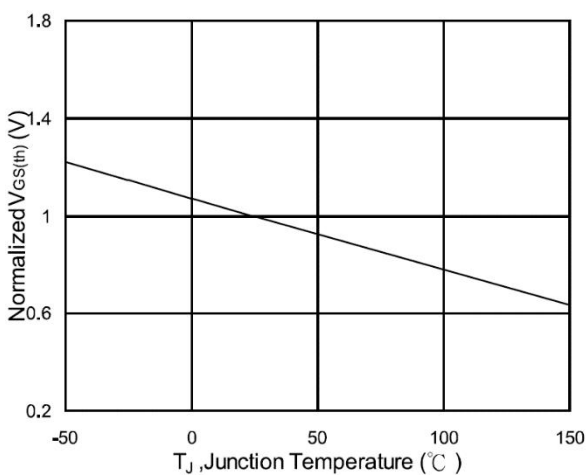
**Fig.2 On-Resistance vs G-S Voltage**



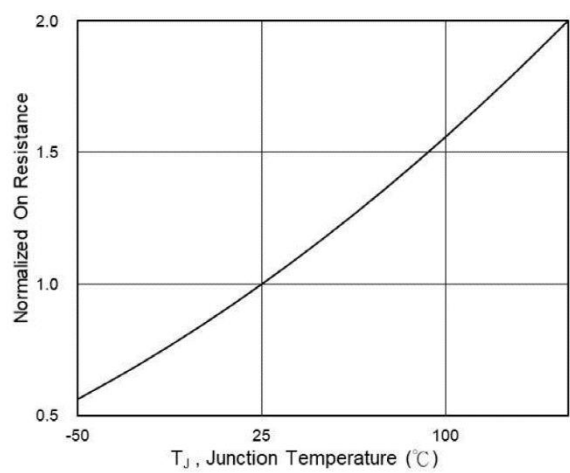
**Fig.3 Source Drain Forward Characteristics**



**Fig.4 Gate-Charge Characteristics**

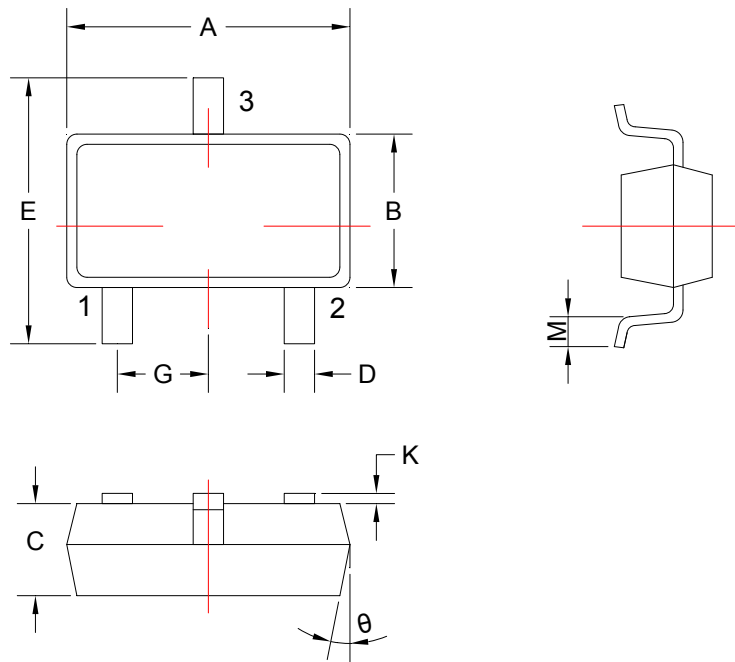


**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**



**Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$**

8. Dimension (SOT23-3L)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER					
SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	2.82	3.02	G	0.95 TYP	
B	1.50	1.70	K	0	0.10
C	1.05	1.15	M	0.20	-
D	0.30	0.50	θ	7°	11°
E	2.65	2.95			

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