

SuperMOS – SOT-23 100V V_{DS} , 90m Ω $R_{DS(on)}$, 2.6A I_D N-channel MOSFET

1. Description

The ES5N10 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 ES5N10 is Pb-free.

2. Features

- 100V, $R_{DS(on)}$ =90m Ω (Typ), V_{GS} =10V
 $R_{DS(on)}$ =120m Ω (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


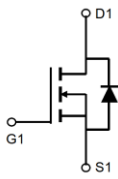
3. Applications

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

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ES5N10	SOT-23	ES5N10	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	$T_A=25^\circ\text{C}$	2.6
		$T_A=75^\circ\text{C}$	2
Maximum Power Dissipation	P_D	1.4	W
Pulsed Drain Current ^A	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 ^B	$R_{\theta JA}$		90	°C/W

Note:

A. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

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
OFF CHARACTERISTICS						
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	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
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 Ω
		$V_{GS}=4.5V, I_D=2A$		120	195	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
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		
SWITCHING CHARACTERISTICS						
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		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1.0A$		0.8	1.2	V

7. Typical Characteristic

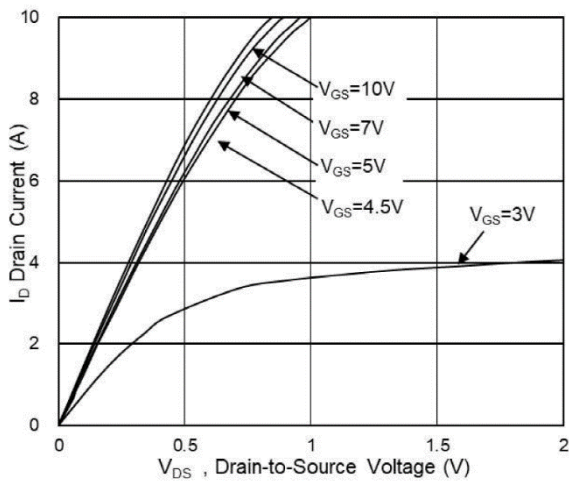


Fig.1 Typical Output Characteristics

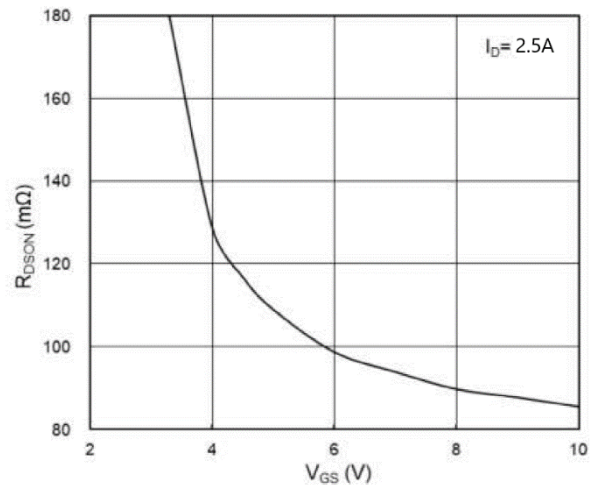


Fig.2 On-Resistance vs G-S Voltage

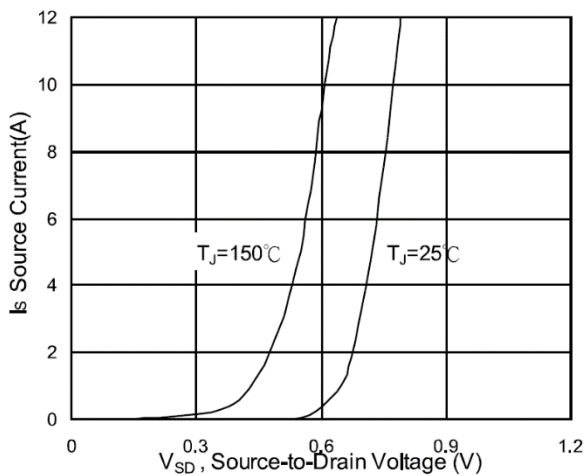


Fig.3 Source Drain Forward Characteristics

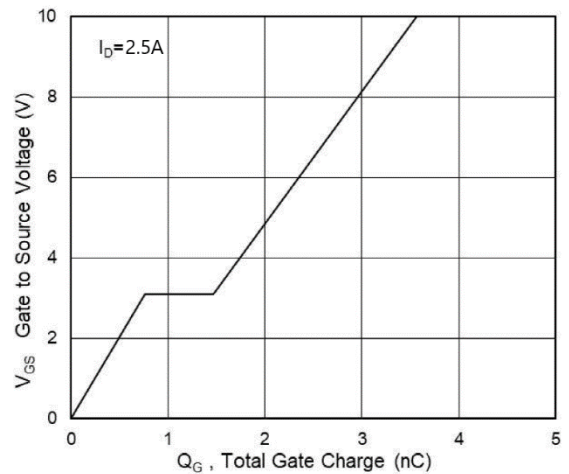


Fig.4 Gate-Charge Characteristics

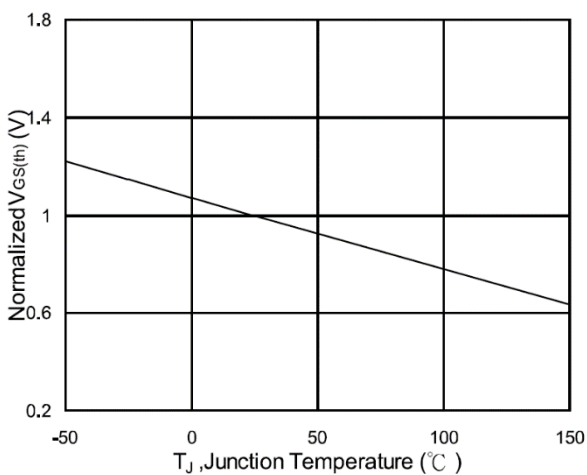


Fig.5 Normalized $V_{GS(th)}$ vs T_J

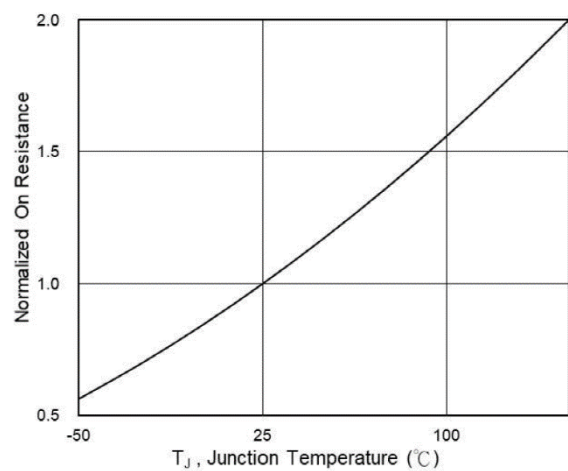
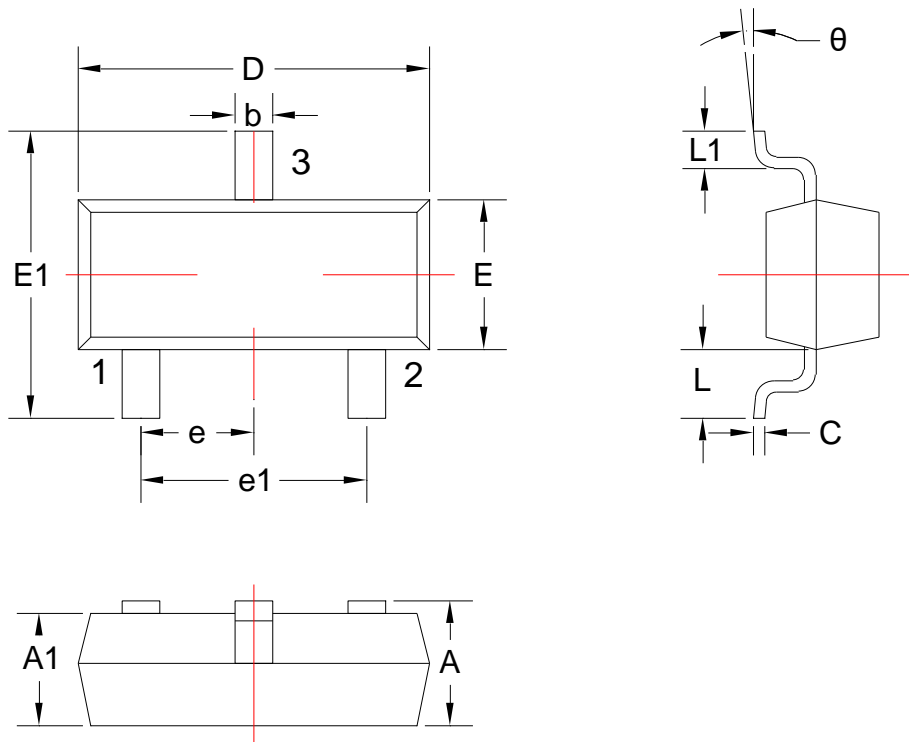
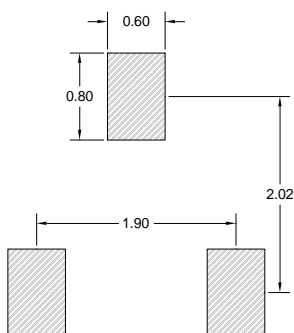


Fig.6 Normalized $R_{DS(on)}$ vs T_J

8. Dimension (SOT-23)



Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	0.900	1.150	E1	2.250	2.550
A1	0.900	1.050	e	0.950TYP	
b	0.300	0.500	e1	1.800	2.000
c	0.080	0.150	L	0.550REF	
D	2.800	3.00	L1	0.300	0.500
E	1.200	1.400	theta	0°	8°



Note:

1. Controlling dimension: in millimeters
2. General tolerance: $\pm 0.05\text{mm}$
3. The pad layout is for reference only
4. Unit: mm

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