

SuperMOS – SOT-23-3 30V BV,30m Ω R_{DS},5.8A I_D N-channel MOSFET

1. Description

The ES3400A 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 ES3400A is Pb-free.

2. Features

- 30V, R_{DS(ON)}<28m Ω @V_{GS}=10V
R_{DS(ON)}<33m Ω @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
ES3400A	SOT-23-3L	3400	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

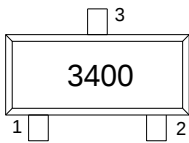
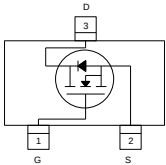
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

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}	± 12	V
Continuous Drain Current ^a	$T_A=25^{\circ}\text{C}$	I_D	5.8	A
	$T_A=70^{\circ}\text{C}$		4.6	
Maximum Power Dissipation ^a	$T_A=25^{\circ}\text{C}$	P_D	1.4	W
	$T_A=70^{\circ}\text{C}$		0.9	
Pulsed Drain Current ^c		I_{DM}	30	A
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	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	75	90	$^{\circ}\text{C/W}$
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	43	70	

Note:

- a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper
- b Surface mounted on FR4 board using minimum pad size, 1oz copper
- c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

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} =24V, V _{GS} =0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±12V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	0.6	1.0	1.3	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =5.8A		21.0	28.0	mΩ
		V _{GS} =4.5V, I _D =5.0A		25.0	33.0	
		V _{GS} =2.5V, I _D =3.0A		33.0	51.0	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =5.8A		7.8	15	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =10V		550		pF
Output Capacitance	C _{OSS}			62		
Reverse Transfer Capacitance	C _{RSS}			48		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =4.5V, V _{DS} =10V, I _D =5.8A		6.7		nC
Threshold Gate Charge	Q _{G(TH)}			0.75		
Gate-to-Source Charge	Q _{GS}			1.65		
Gate-to-Drain Charge	Q _{GD}			1.78		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =4.5V, V _{DS} =10V, R _L =10Ω, R _G =6Ω		3.8		ns
Rise Time	t _r			13.0		
Turn-Off Delay Time	t _{d(OFF)}			14.2		
Fall Time	t _f			2.0		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A		0.75	1.5	V

7. Typical Characteristic

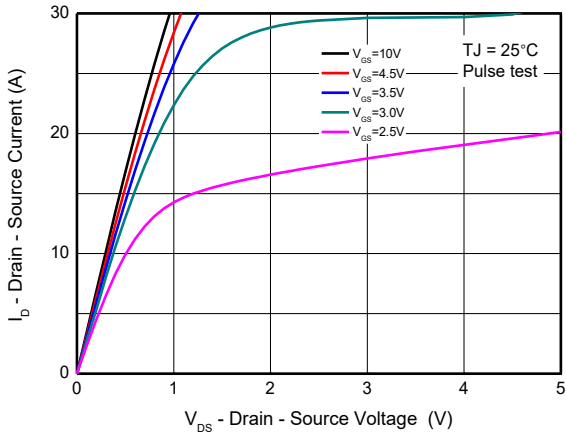


Figure 1. Typ. Output

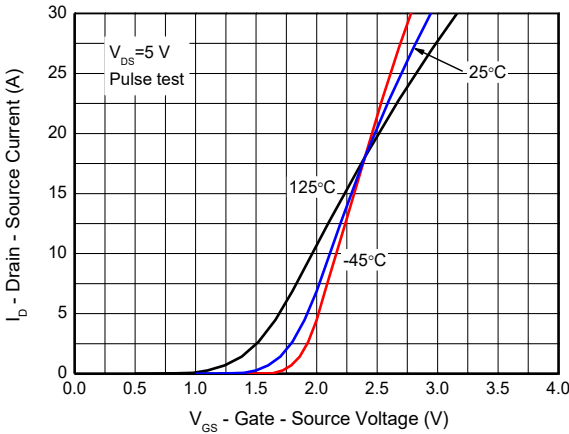


Figure 2. Transfer Characteristics

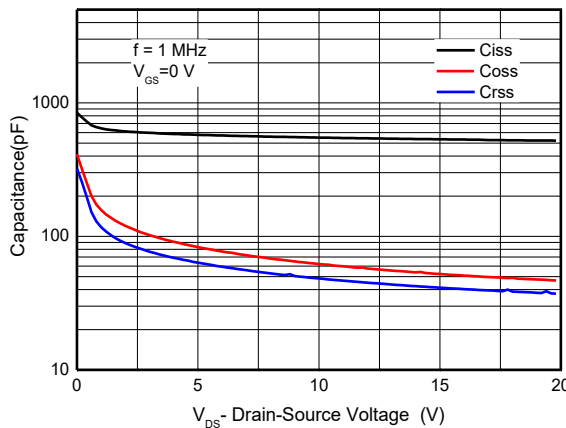


Figure 3. Capacitance Characteristics

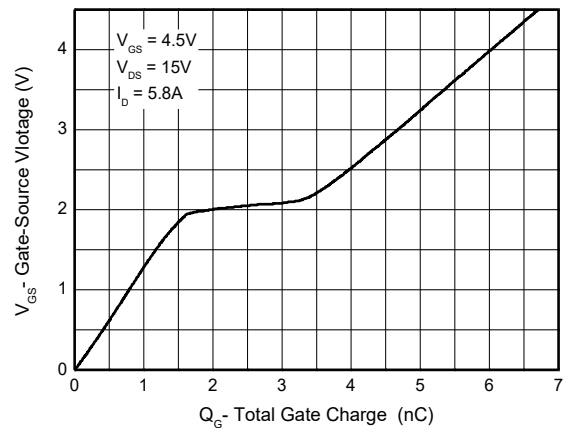


Figure 4. Gate Charge Waveform

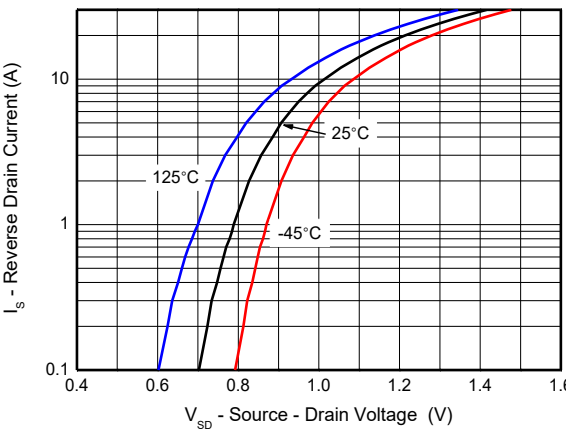


Figure 5. Body-Diode Characteristics

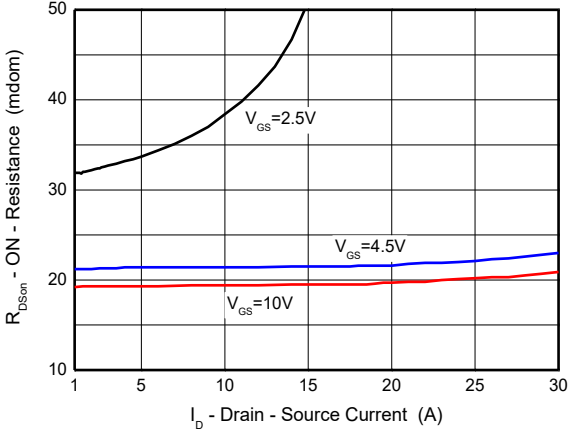


Figure 6. $R_{DS(on)}$ -Drain Current

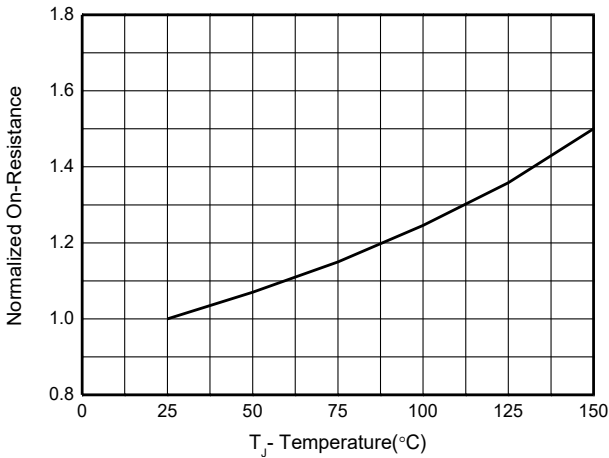


Figure 7. Rdson-Junction Temperature(°C)

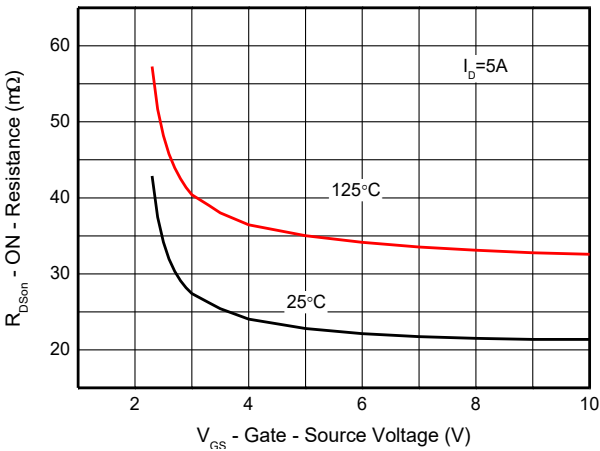


Figure 8: On-Resistance vs. Gate-Source

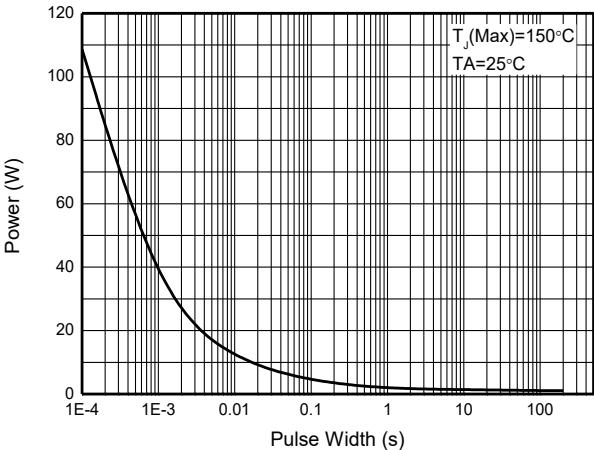


Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note E)

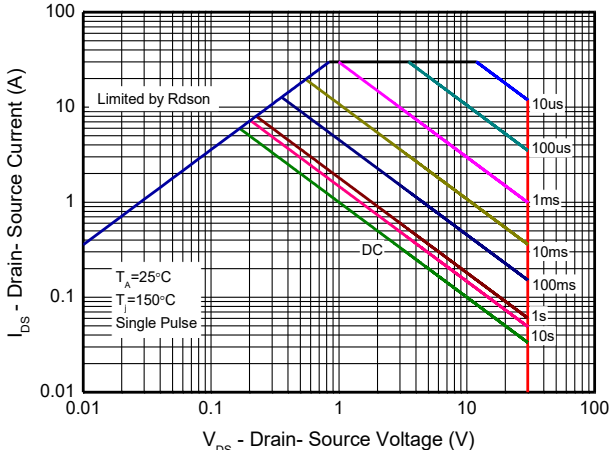
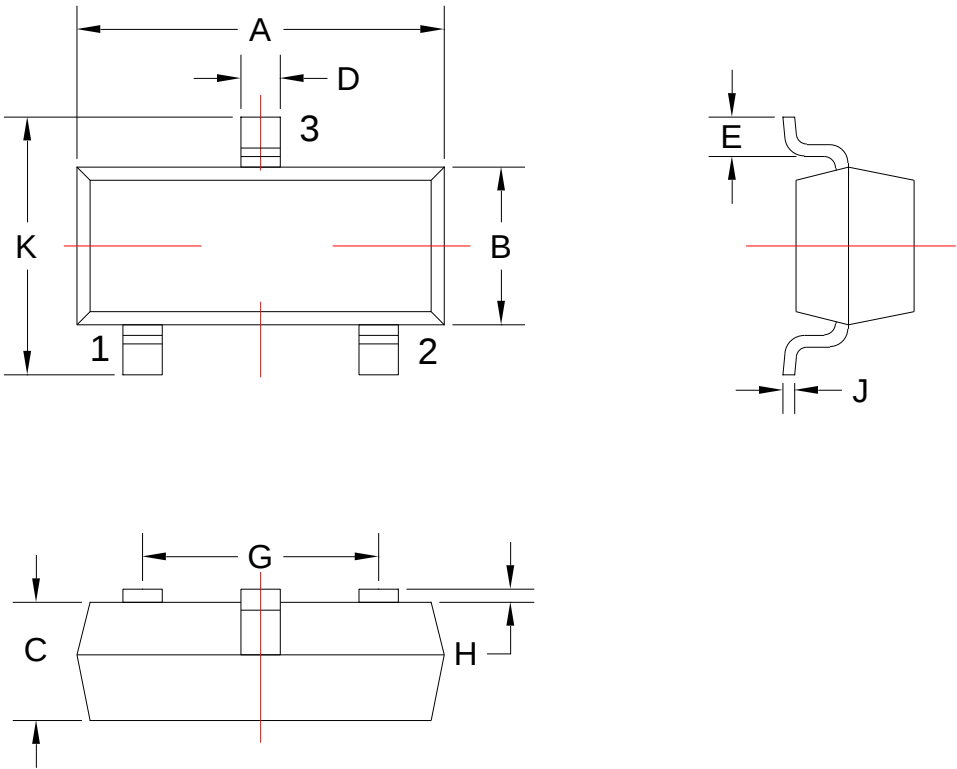


Figure 10. Maximum Safe Operation Area

8. Dimension and Patterns (SOT-23-3)



COMMON DIMENSIONS				
SYMBOL	MILLIMETERS		INCHS	
	MIN	MAX	MIN	MAX
A	2.8	3	0.11	0.118
B	1.5	1.7	0.059	0.067
C	1	1.2	0.039	0.047
D	0.3	0.5	0.012	0.02
E	0.25	0.55	0.01	0.022
G	1.90 TYP.		0.075 TYP.	
H	0	0.1	0	0.004
J	0.04	0.21	0.002	0.008
K	2.6	3	0.102	0.118

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