

SuperMOS –SOT-23 30V BV_{DSS} 17m Ω $R_{DS(on)}$, N-channel MOSFET

1. Description

The ES3404 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 ES3404 is Pb-free.

2. Features

- 30V, $R_{DS(on)}=17m\Omega$ (TYP.) @ $V_{GS}=10V$
 $R_{DS(on)}=26m\Omega$ (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
- DC/DC conversion
- Power management in portable/desktop PCs

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ES3404	SOT-23	R4	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

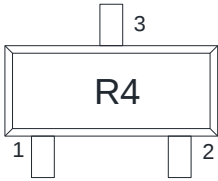
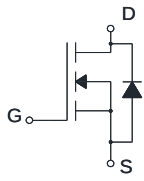
Pin	Function	Outline	Circuit Diagram
2	Source		
1	Gate		
3	Drain		

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}	± 20	V
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_D	6.2	A
	$T_A=75^{\circ}\text{C}$		4.7	
Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	1.4	W
	$T_A=75^{\circ}\text{C}$		0.9	
Pulsed Drain Current ^a		I_{DM}	24.8	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	$R_{\theta JA}$	72	90	$^{\circ}\text{C/W}$

Note:

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

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} =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	1.0	1.5	2.2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =5A		17	24	mΩ
		V _{GS} =4.5V, I _D =4A		26	38	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =5A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =15V		255		pF
Output Capacitance	C _{OSS}			45		
Reverse Transfer Capacitance	C _{RSS}			35		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =15V, I _D =5A		9.8	12	nC
Gate-to-Source Charge	Q _{GS}			1.8	2.2	
Gate-to-Drain Charge	Q _{GD}			2.2	3	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =15V, R _L =2Ω, R _{GEN} =3Ω		5		ns
Rise Time	t _r			3.2		
Turn-Off Delay Time	t _{d(OFF)}			24		
Fall Time	t _f			6		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A	0.45		1.2	V

7. Typical Characteristic

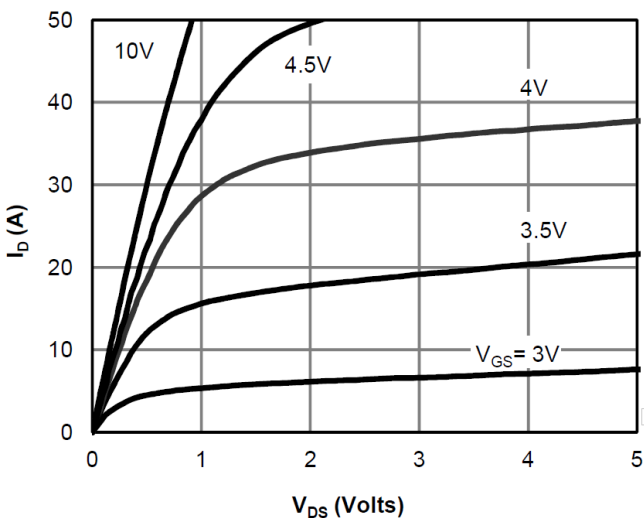


Figure 1: On-Region Characteristics

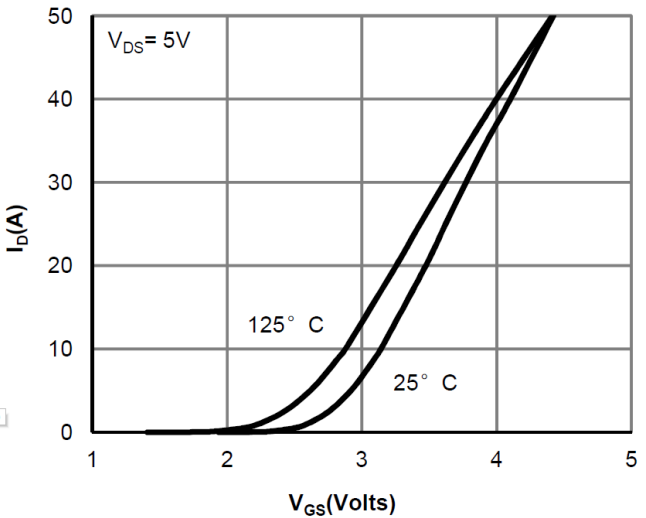


Figure 2: Transfer Characteristics

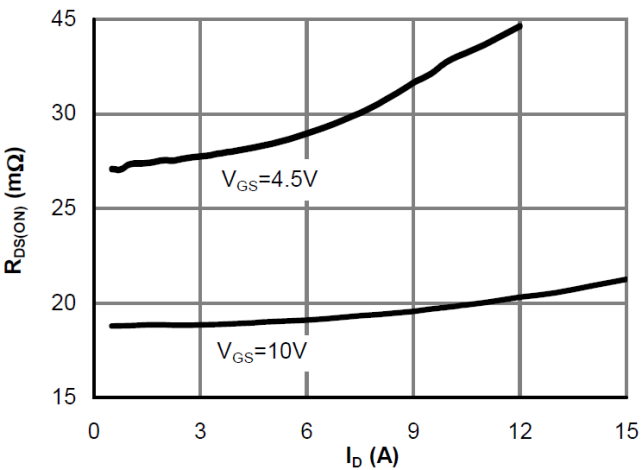


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

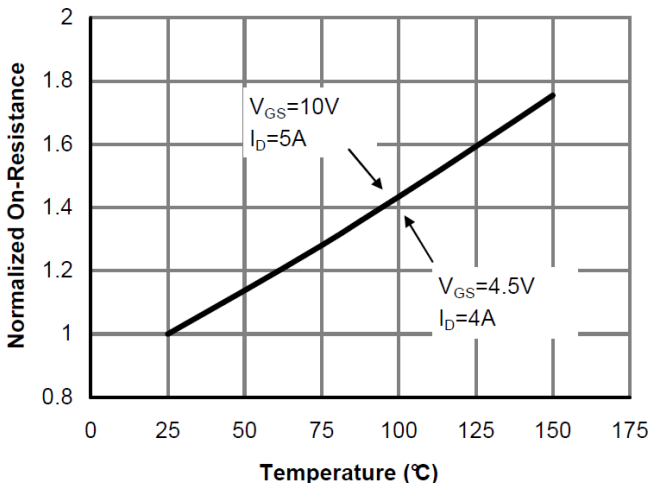


Figure 4: On-Resistance vs. Junction Temperature

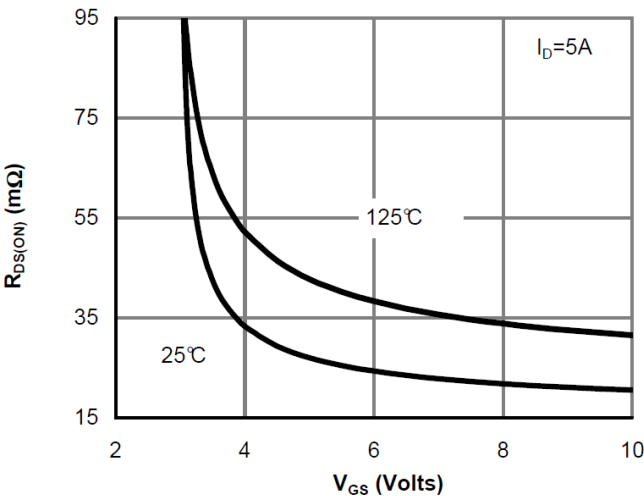


Figure 5: On-Resistance vs. Gate-Source Voltage

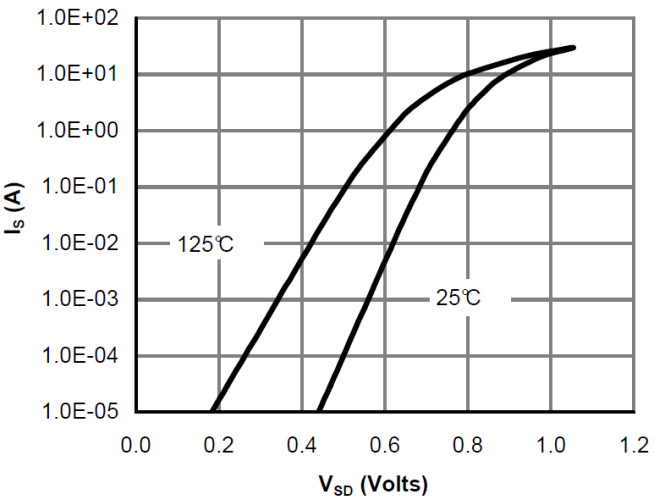


Figure 6: Body-Diode Characteristics

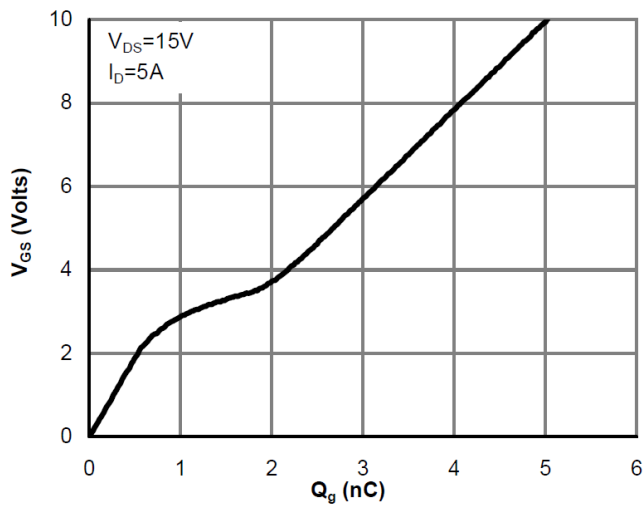


Figure 7: Gate-Charge Characteristics

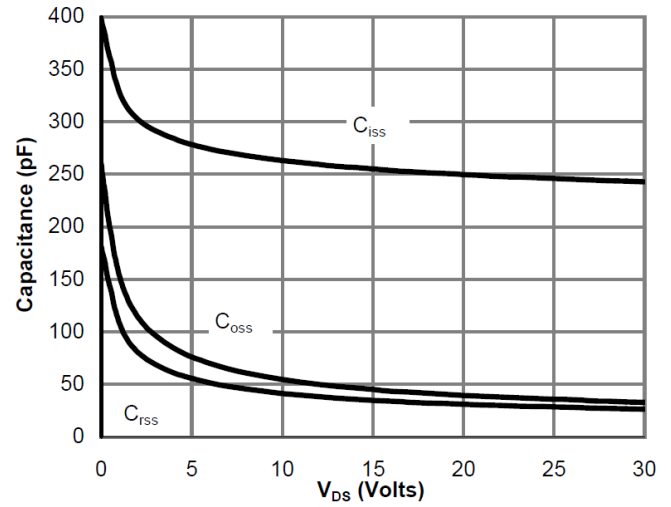


Figure 8: Capacitance Characteristics

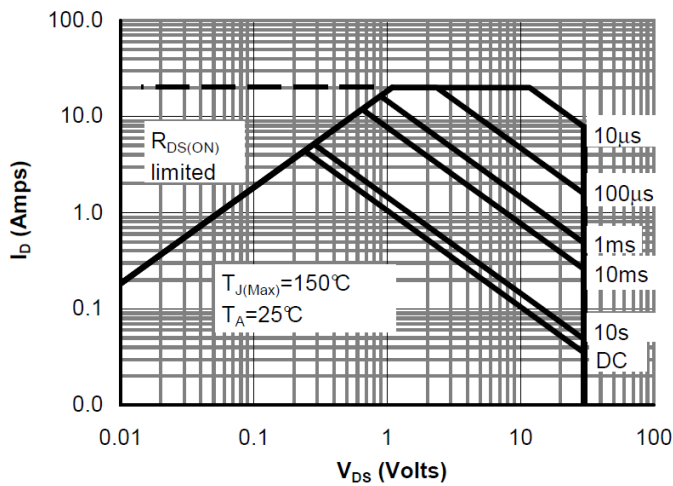


Figure 9: Maximum Forward Biased Safe Operating Area

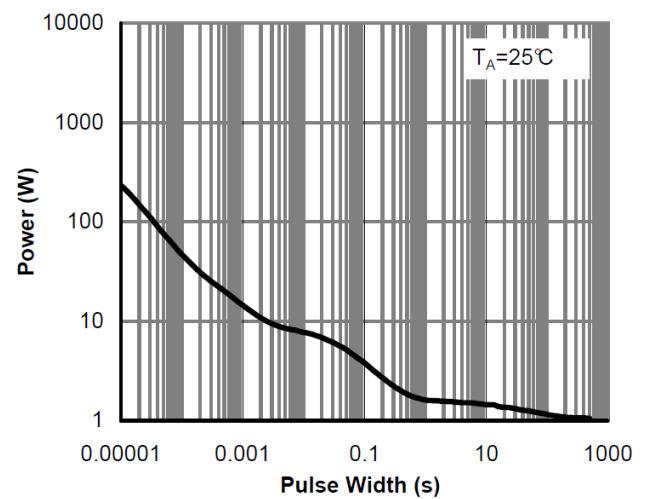


Figure 10: Single Pulse Power Rating Junction-to-Ambient

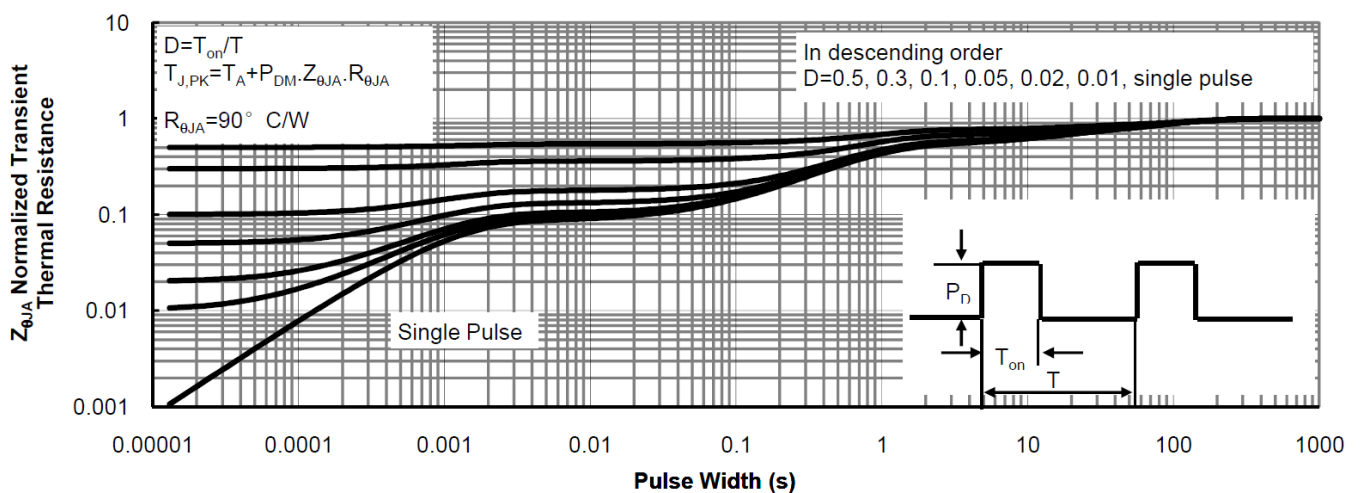
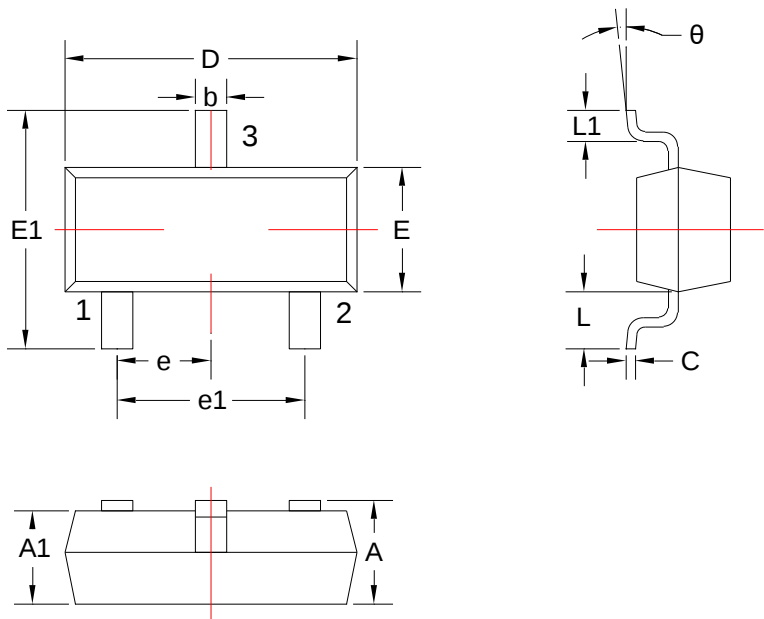


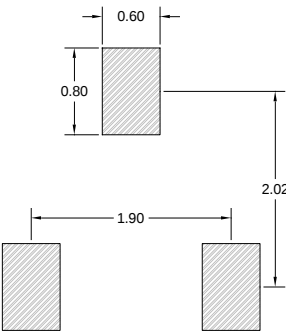
Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension (SOT-23)



Units: mm

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	θ	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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