

AO6401A(ES)

Rev-1.4

SuperMOS – SOT-23-6L -30V BV_{DSS} , 46m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The AO6401A(ES) is P-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 AO6401A(ES) is Pb-free.

2. Features

- 30V, $R_{DS(ON)}=46m\Omega$ (TYP.) @ $V_{GS}=-10V$
 $R_{DS(ON)}=52m\Omega$ (TYP.) @ $V_{GS}=-4.5V$
- Fast Switching
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

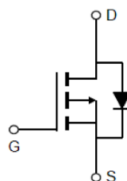
3. Applications

- 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
AO6401A(ES)	SOT-23-6L	.6401	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
3	Gate		
4	Source		
1/2/5/6	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}	-30	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_D	-4.7	A
	$T_A=75^{\circ}\text{C}$		-3.7	
Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	2	W
	$T_A=75^{\circ}\text{C}$		1.2	
Pulsed Drain Current		I_{DM}	-18.8	A
Operating Junction Temperature		T_J	150	$^{\circ}\text{C}$
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 ($t \leq 10\text{s}$)	$R_{\theta JA}$	47.5	62.5	$^{\circ}\text{C/W}$

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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	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	-0.5	-0.8	-1.1	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-4.5A		46	58	mΩ
		V _{GS} =-4.5V, I _D =-3.5A		52	65	
Forward Trans conductance	g _{FS}	V _{DS} =-5.0V, I _D =-4.5A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-15V f=1MHz		650		pF
Output Capacitance	C _{OSS}			85		
Reverse Transfer Capacitance	C _{RSS}			55		
Total Gate Charge	Q _G	V _{GS} =-10V, V _{DS} =-10V I _D =-4.5A		15		nC
Gate-to-Source Charge	Q _{GS}			7.5		
Gate-to-Drain Charge	Q _{GD}			2.63		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-4.5V, V _{DS} =-10V I _D =-4.5A, R _G =3Ω		6.8		ns
Rise Time	t _r			3.1		
Turn-Off Delay Time	t _{d(OFF)}			51		
Fall Time	t _f			12		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-1.0A		-0.78	-1.5	V

7. Typical Characteristic

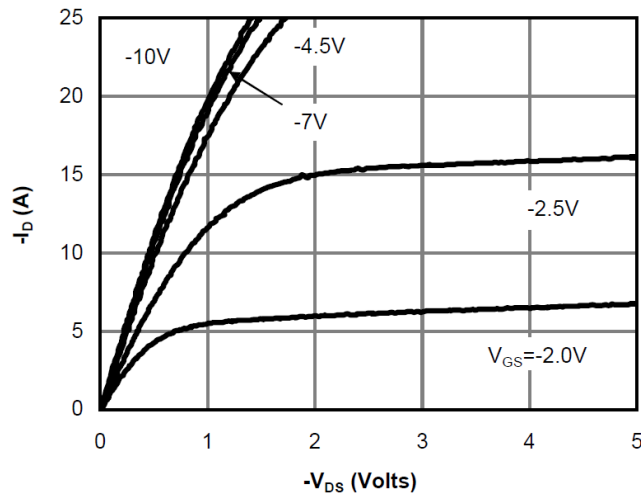


Fig 1: On-Region Characteristics

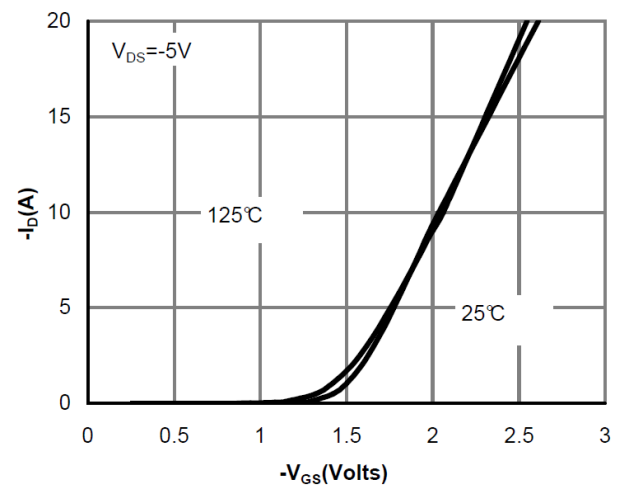


Figure 2: Transfer Characteristics

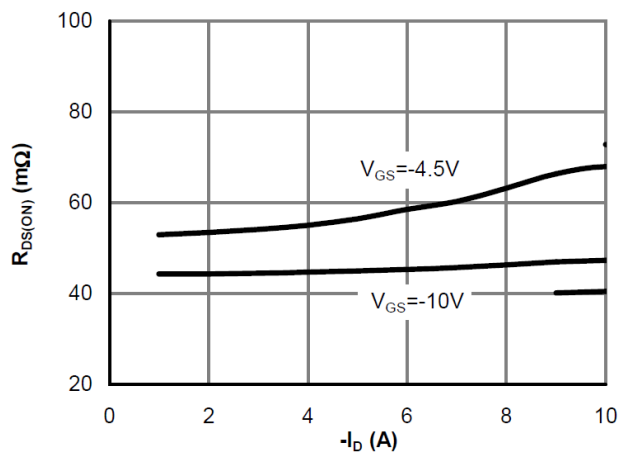


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

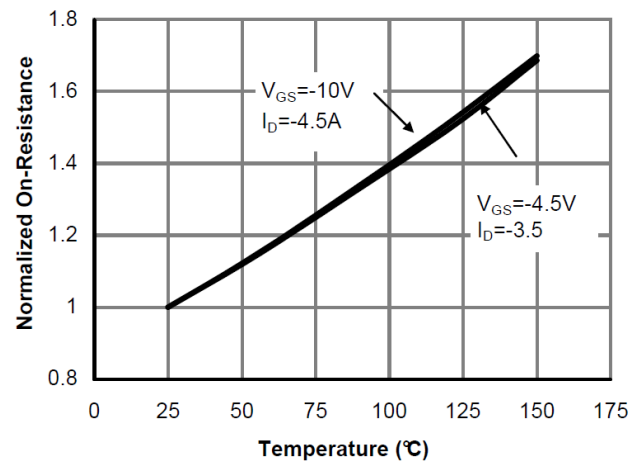


Figure 4: On-Resistance vs. Junction Temperature

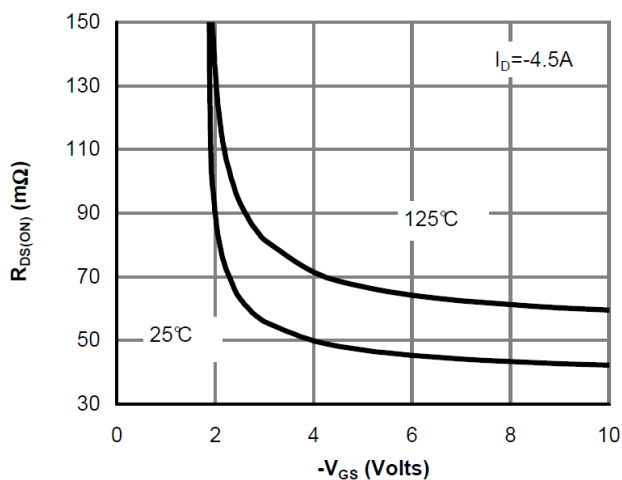


Figure 5: On-Resistance vs. Gate-Source Voltage

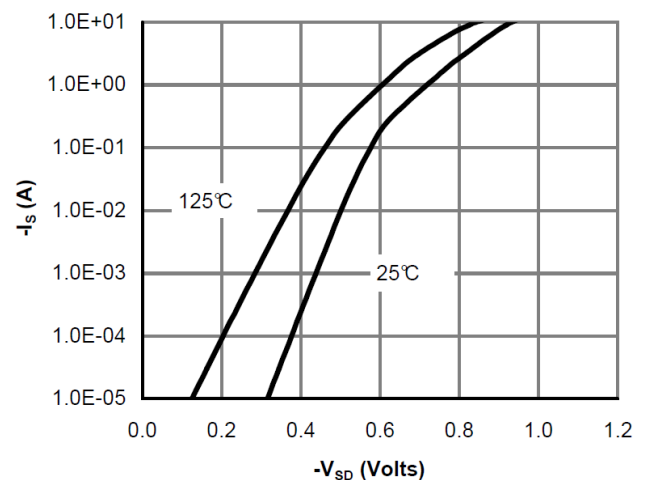


Figure 6: Body-Diode Characteristics

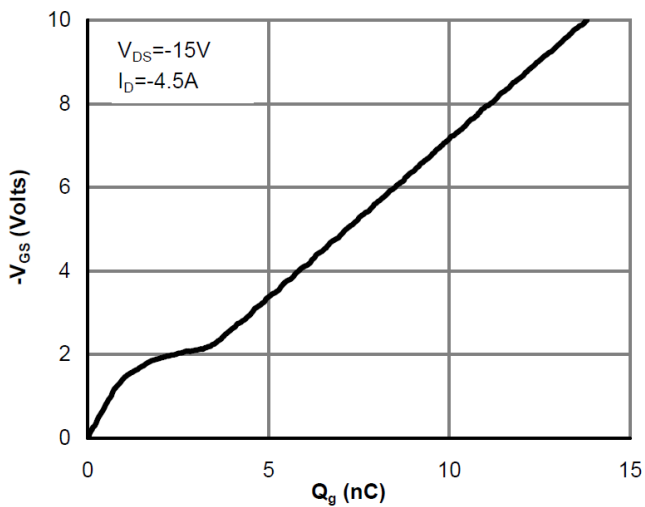


Figure 7: Gate-Charge Characteristics

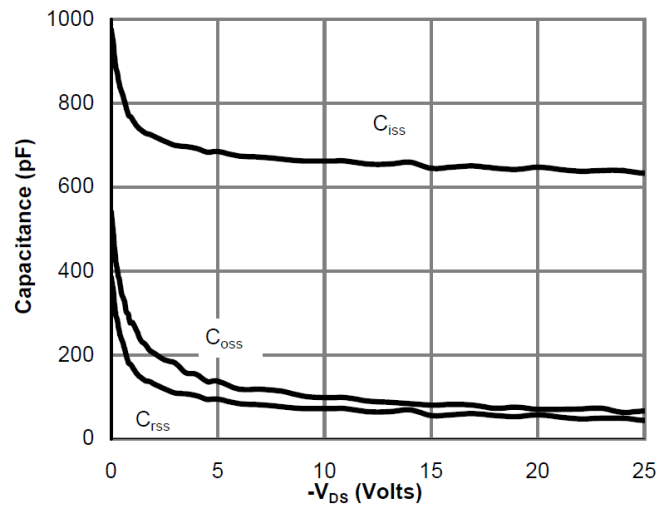


Figure 8: Capacitance Characteristics

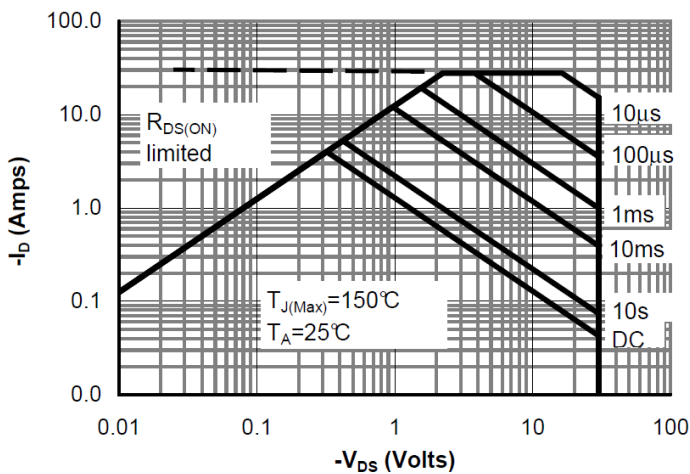


Figure 9: Maximum Forward Biased Safe Operating Area

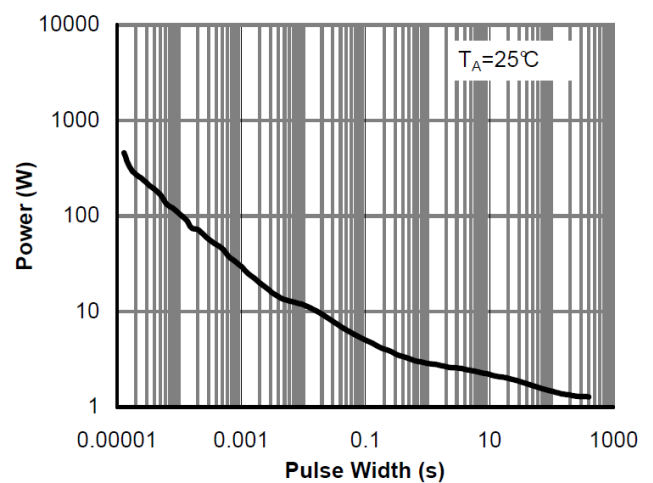
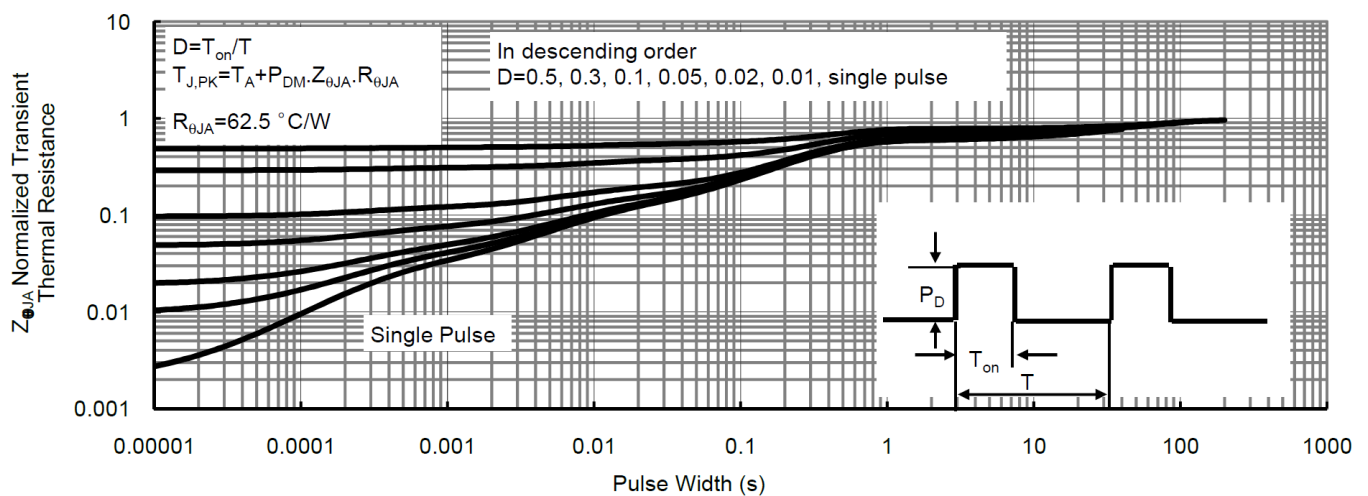
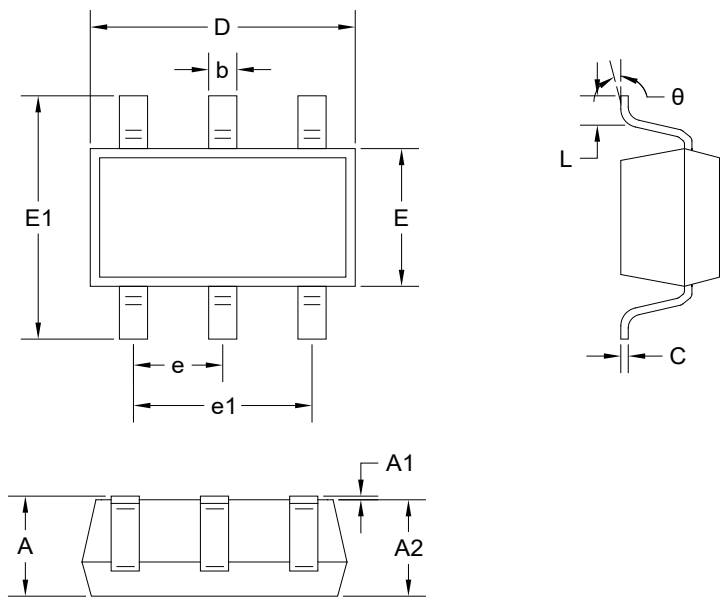


Figure 10: Single Pulse Power Rating Junction-to-Ambient



8. Dimension (SOT-23-6L)



Symbol		A	A1	A2	b	c	D
Spec	Min	1.050	0.000	1.050	0.300	0.100	2.820
	Max	1.250	0.100	1.150	0.500	0.200	3.020
Symbol		E	E1	e	e1	L	θ
Spec	Min	1.500	2.650	0.950BSC	1.800	0.300	0°
	Max	1.700	2.950		2.000	0.600	8°

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