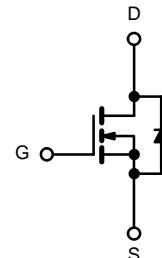


**Description**

The AO4404 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



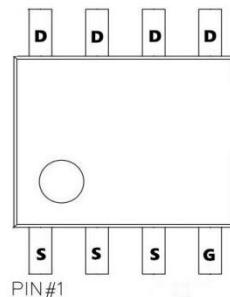
N-Channel MOSFET

 $V_{DS} = 30V$   $I_D = 8.5 A$  $R_{DS(ON)} < 20m\Omega$  @  $V_{GS}=10V$ **Application**

Battery protection

Load switch

Uninterruptible power supply



PIN #1

**Absolute Maximum Ratings** $T_A = 25^\circ C$ , unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 16$	
Continuous Drain Current ( $T_J = 150^\circ C$ )	$I_D$	12	A
		11	
		10 <sup>b, c</sup>	
		8 <sup>b, c</sup>	
Pulsed Drain Current	$I_{DM}$	47	
Continuous Source-Drain Diode Current	$I_S$	3.7	
		2.0 <sup>b, c</sup>	
Single Pulse Avalanche Current	$I_{AS}$	20	mJ
Avalanche Energy	$E_{AS}$	21	
Maximum Power Dissipation	$P_D$	4.1	W
		2.5	
		2.2 <sup>b, c</sup>	
		1.3 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{Stg}$	- 55 to 150	°C

**Thermal resistance rating**

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, d</sup>	$R_{thJA}$	39	55	°C/W
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	25	29	

Notes:

- a. Base on  $T_C = 25^\circ C$ .
- b. Surface Mounted on 1" x 1" FR4 board.
- c.  $t = 10 s$ .
- d. Maximum under Steady State conditions is 85 °C/W.

**Specifications**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

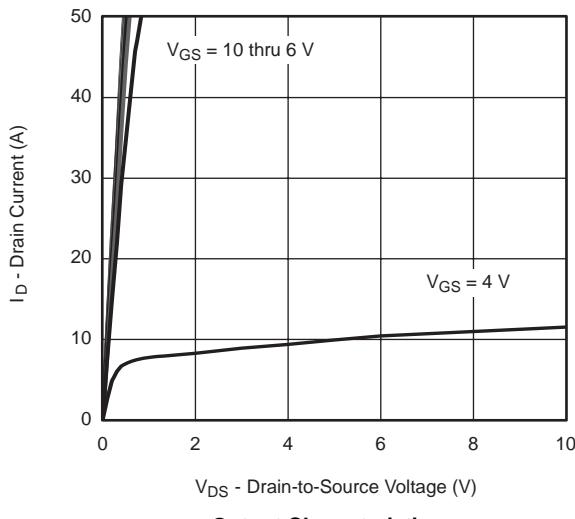
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	20			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		26		mV/°C
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 6		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}$			1	μA
		$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}, V_{GS} = 10 \text{ V}$	20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}, I_D = 8 \text{ A}$		13	20	MΩ
		$V_{GS} = 4.5 \text{ V}, I_D = 3 \text{ A}$		19	30	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10 \text{ V}, I_D = 10 \text{ A}$		50		S
Input Capacitance	$C_{iss}$	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		800		pF
Output Capacitance	$C_{oss}$			165		
Reverse Transfer Capacitance	$C_{rss}$			73		
Total Gate Charge	$Q_g$	$V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$		15	23	nC
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 10 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 10 \text{ A}$		6.8	10.2	
Gate-Drain Charge	$Q_{gd}$			2.5		
Gate Resistance	$R_g$	$f = 1 \text{ MHz}$	0.36	1.8	3.6	Ω
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 10 \text{ V}, R_L = 1.4 \Omega$ $I_D \geq 9 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		16	23	ns
Rise Time	$t_r$			12	16	
Turn-Off Delay Time	$t_{d(\text{off})}$			16	22	
Fall Time	$t_f$			10	18	
Turn-On Delay Time	$t_{d(\text{on})}$			8	16	
Rise Time	$t_r$			10	20	
Turn-Off Delay Time	$t_{d(\text{off})}$			16	22	
Fall Time	$t_f$			8	15	
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$			10	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				50	
Body Diode Voltage	$V_{SD}$	$I_S = 9 \text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 9 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$		15	30	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			6	12	nC
Reverse Recovery Fall Time	$t_a$			8		ns
Reverse Recovery Rise Time	$t_b$			7		

Notes:

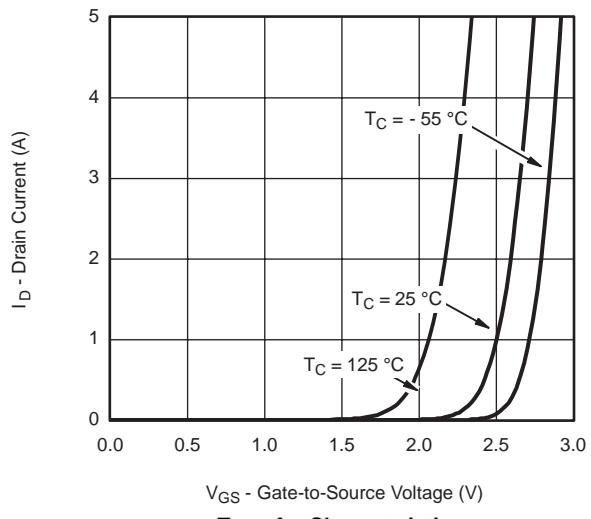
- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2 \%$ .
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

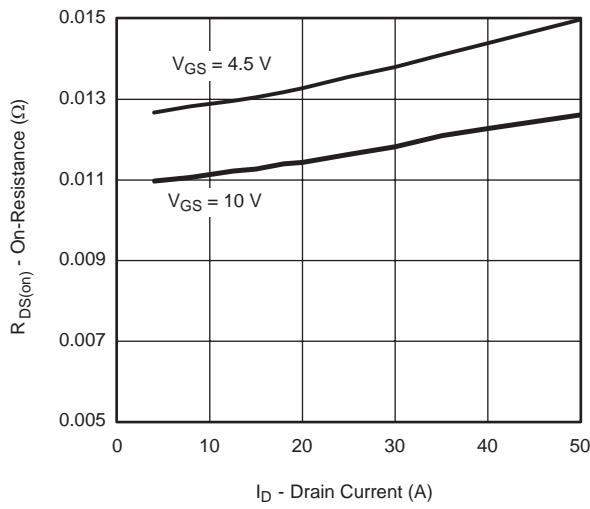
**Typical characteristic** 25 °C, unless otherwise noted



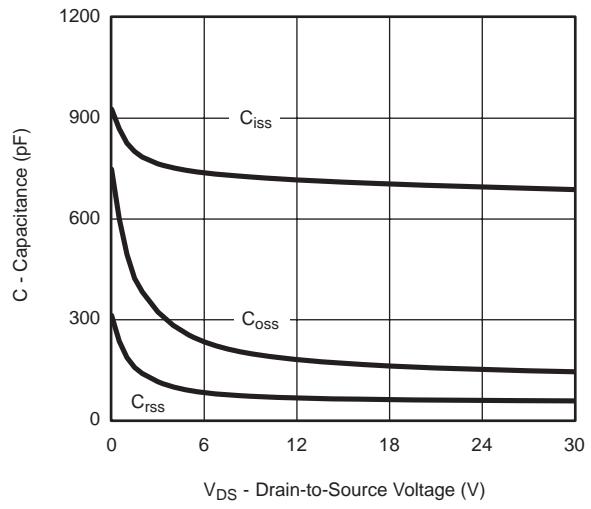
**Output Characteristics**



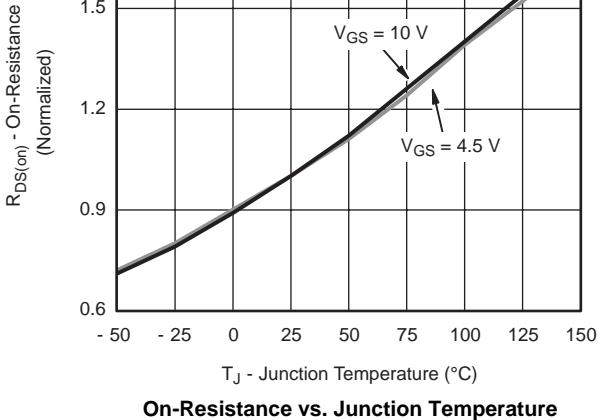
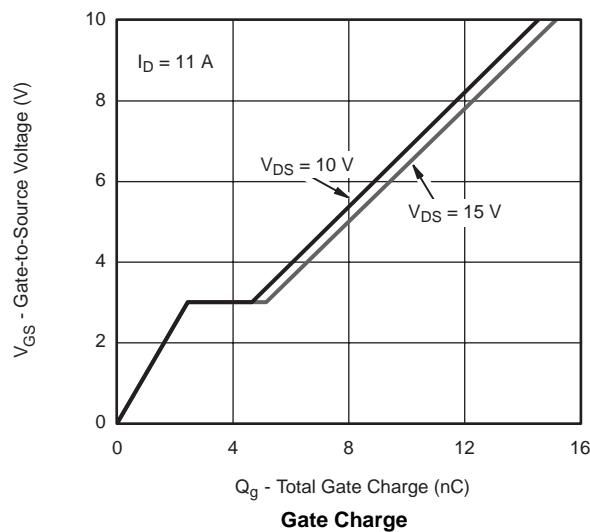
**Transfer Characteristics**



**On-Resistance vs. Drain Current and Gate Voltage**

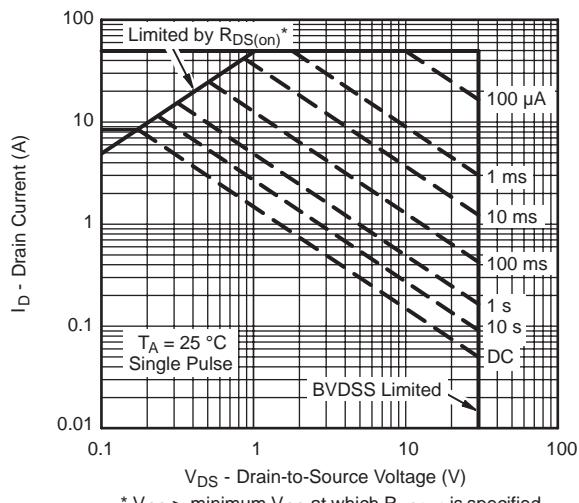
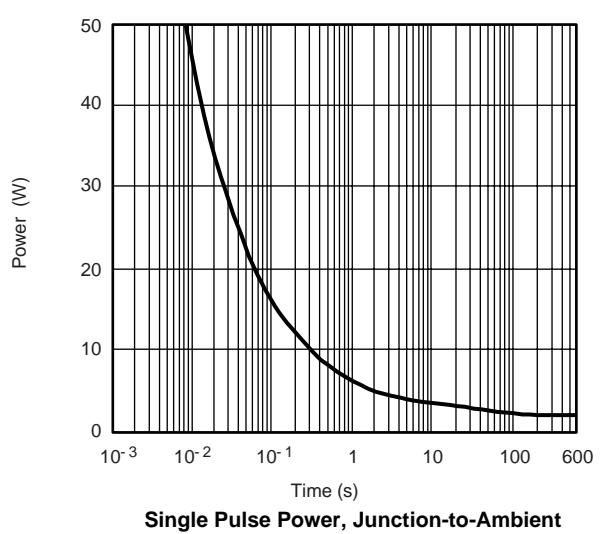
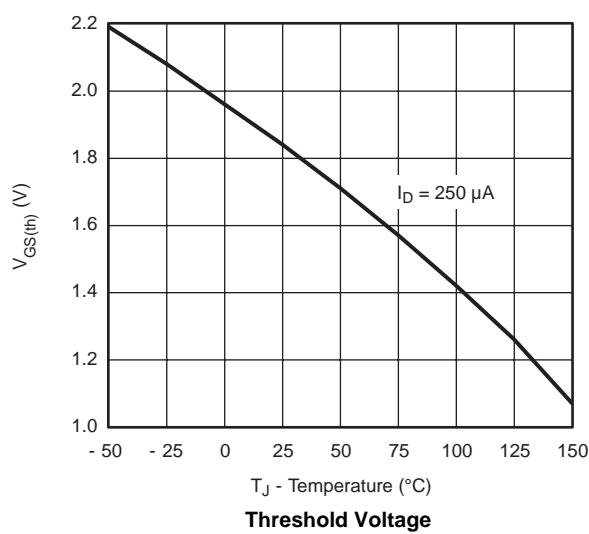
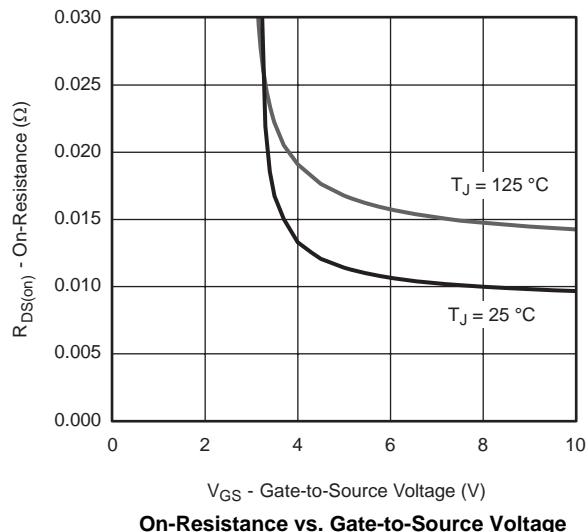
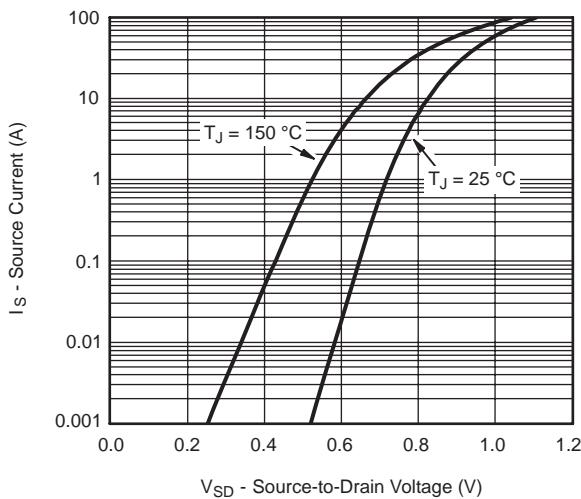


**Capacitance**



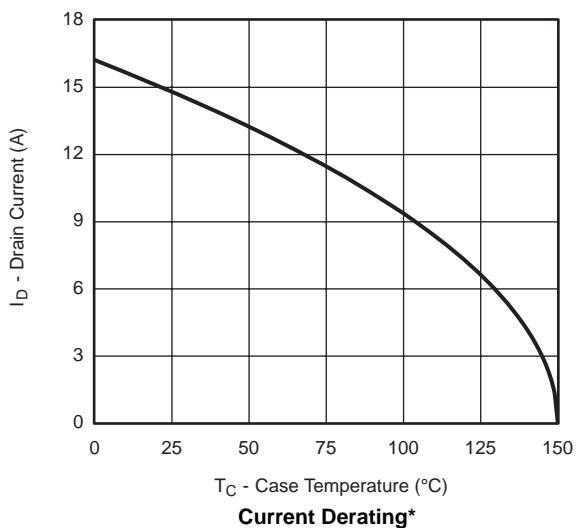
**On-Resistance vs. Junction Temperature**

**Typical characteristic** 25 °C, unless otherwise noted

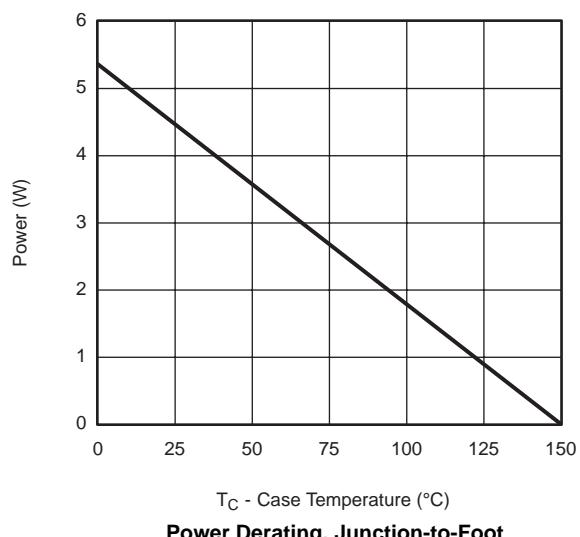


\* V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified

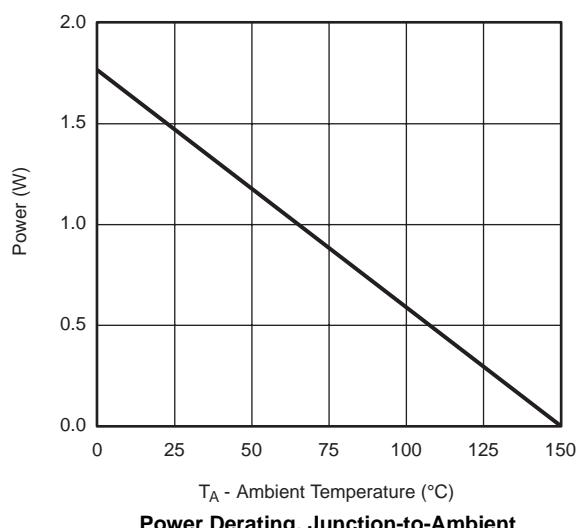
Typical characteristic 25 °C, unless otherwise noted



Current Derating\*



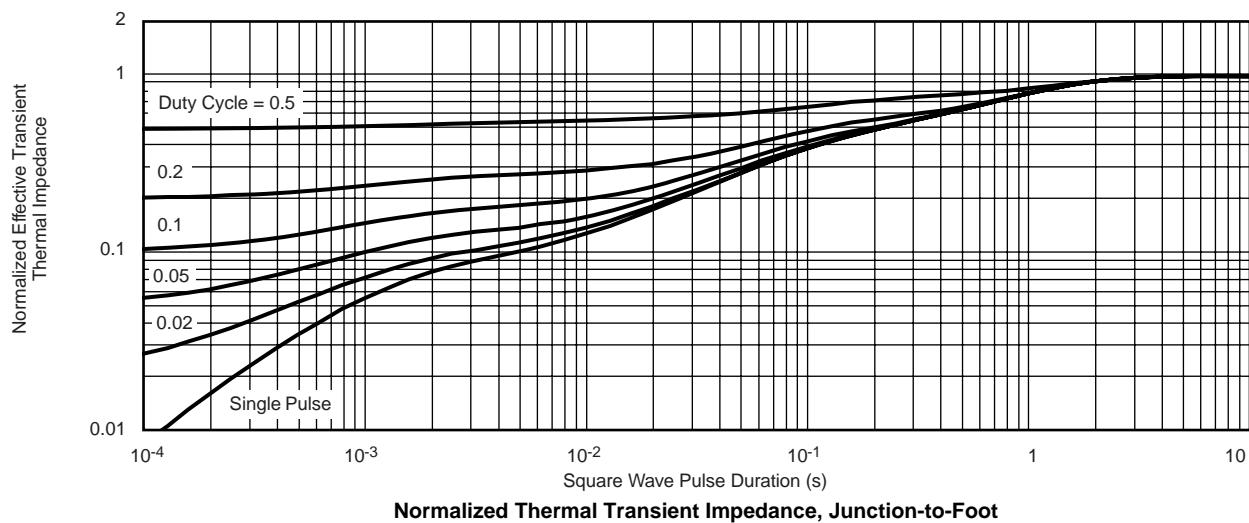
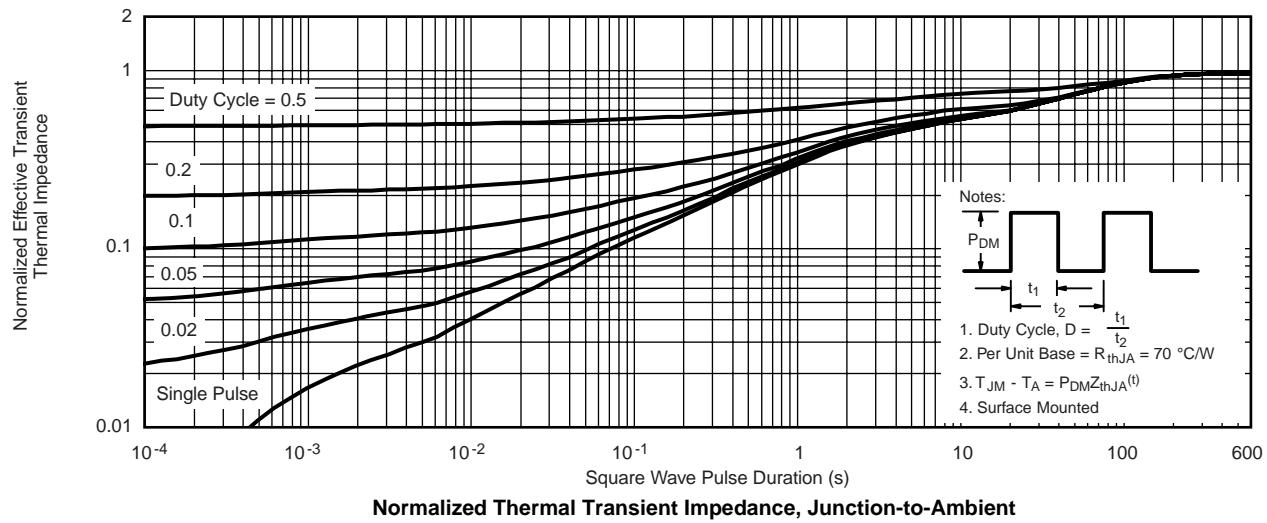
Power Derating, Junction-to-Foot



Power Derating, Junction-to-Ambient

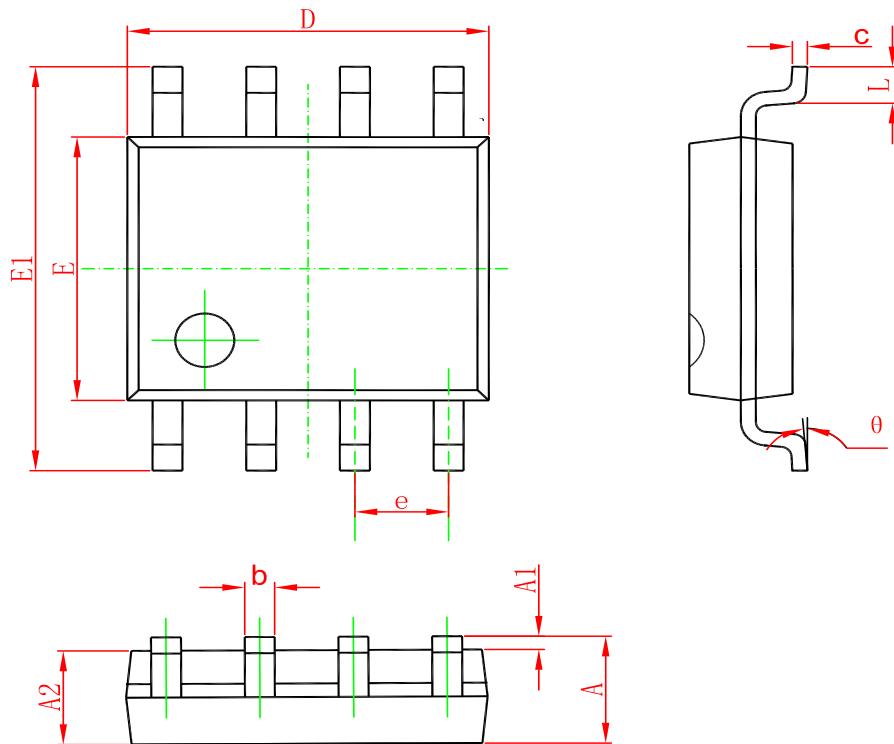
\* The power dissipation  $P_D$  is based on  $T_{J(\max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

Typical characteristic 25 °C, unless otherwise noted



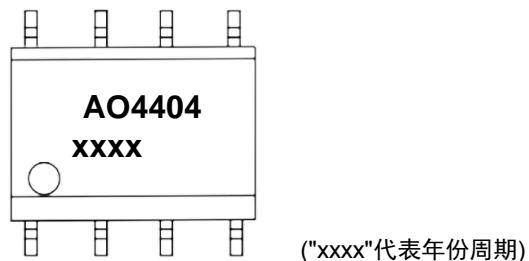
## PACKAGE OUTLINE DIMENSIONS

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

## Marking



("xxxx"代表年份周期)

## Ordering information

Order code	Package	Baseqty	Deliverymode
AO4404	SOP-8	3000	Tape and reel