



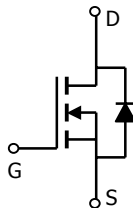
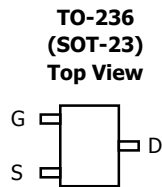
**AO3414, AO3414L**  
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AO3414 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. AO3414L is offered in a lead free package.

**Features**

- $V_{DS}$  (V) = 20V
- $I_D$  = 4.2 A
- $R_{DS(ON)} < 50m\Omega$  ( $V_{GS} = 4.5V$ )
- $R_{DS(ON)} < 63m\Omega$  ( $V_{GS} = 2.5V$ )
- $R_{DS(ON)} < 87m\Omega$  ( $V_{GS} = 1.8V$ )



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	4.2	A
	$T_A=70^\circ C$	3.2	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	15	
Power Dissipation <sup>A</sup>	$T_A=25^\circ C$	1.4	W
	$T_A=70^\circ C$	0.9	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	70	90	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	100	
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	63	80	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±8V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.4	0.6	1	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	15			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.2A T <sub>J</sub> =125°C		41 58	50 70	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.7A		52	63	mΩ
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =3.2A		67	87	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =4.2A		11		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.76	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz		436		pF
C <sub>oss</sub>	Output Capacitance			66		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			44		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		3		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =4.2A		6.2		nC
Q <sub>gs</sub>	Gate Source Charge			1.6		nC
Q <sub>gd</sub>	Gate Drain Charge			0.5		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =5V, V <sub>DS</sub> =10V, R <sub>L</sub> =2.7Ω, R <sub>GEN</sub> =6Ω		5.5		ns
t <sub>r</sub>	Turn-On Rise Time			6.3		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			40		ns
t <sub>f</sub>	Turn-Off Fall Time			12.7		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =4A, di/dt=100A/μs		12.3		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =4A, di/dt=100A/μs		3.5		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any a given application depends on the user's specific board design. The current rating is based on the t≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

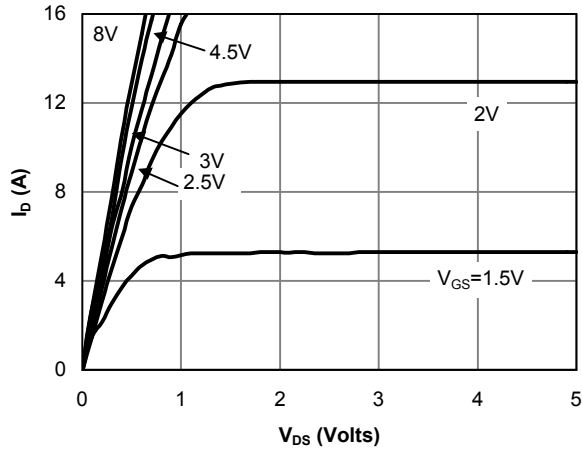


Fig 1: On-Region Characteristics

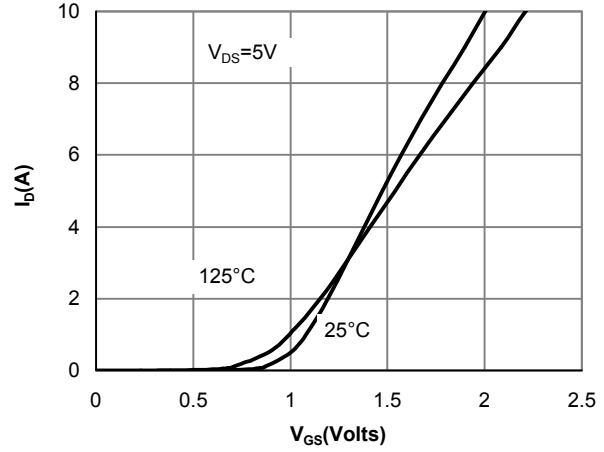


Figure 2: Transfer Characteristics

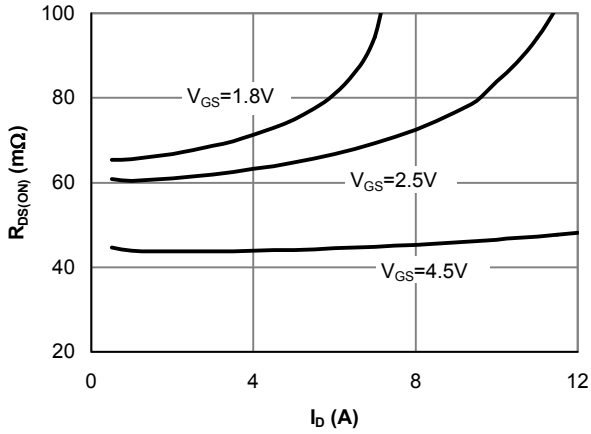


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

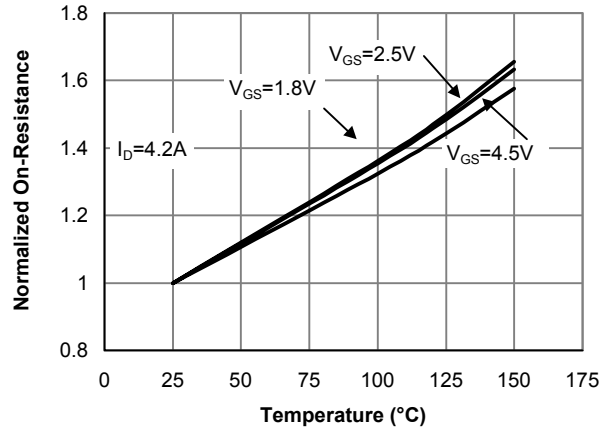


Figure 4: On-Resistance vs. Junction Temperature

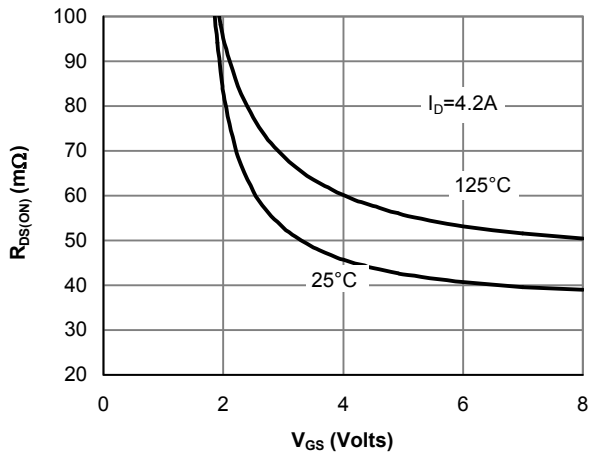


Figure 5: On-Resistance vs. Gate-Source Voltage

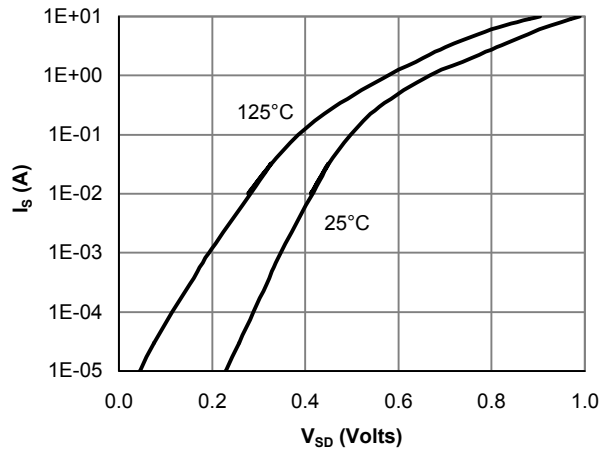


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

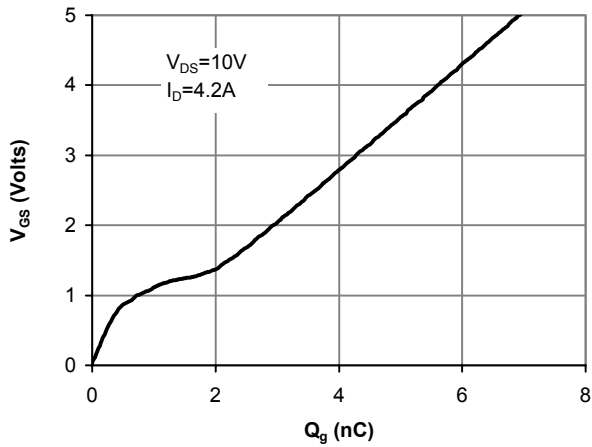


Figure 7: Gate-Charge Characteristics

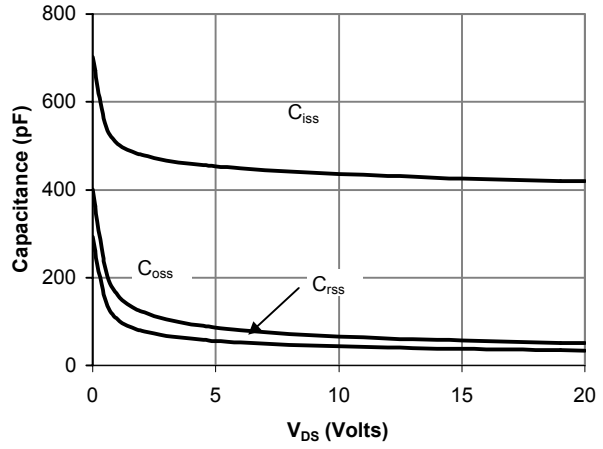


Figure 8: Capacitance Characteristics

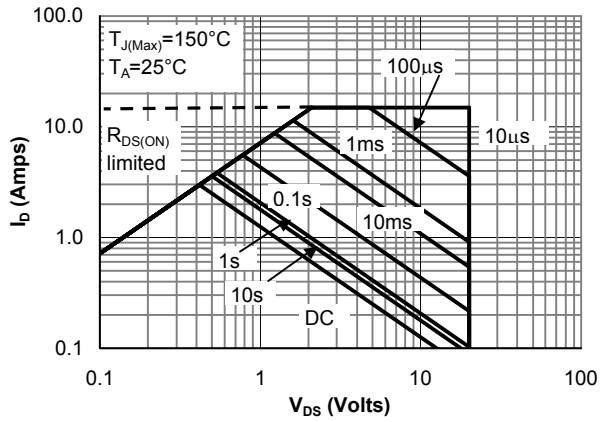


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

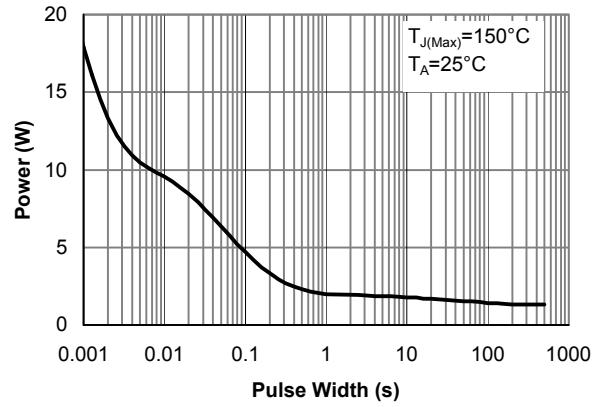


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

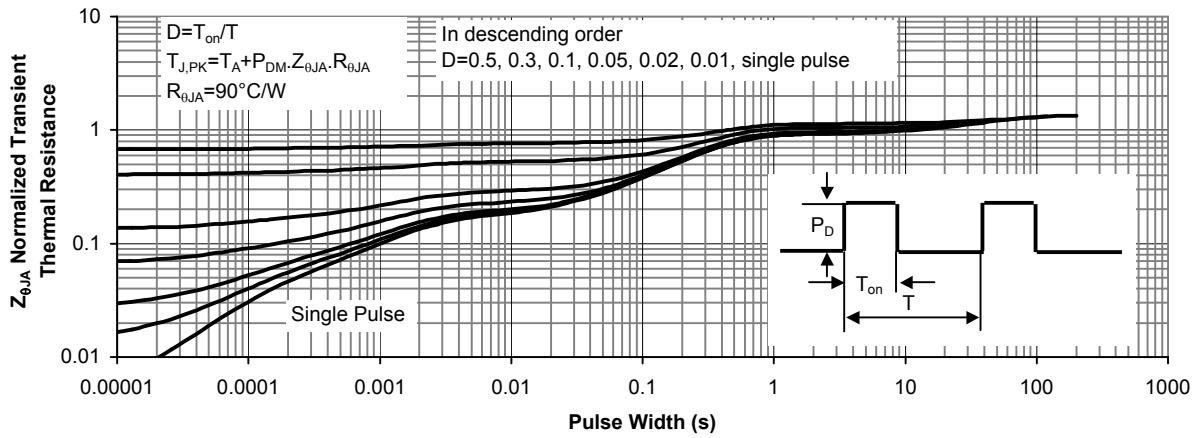
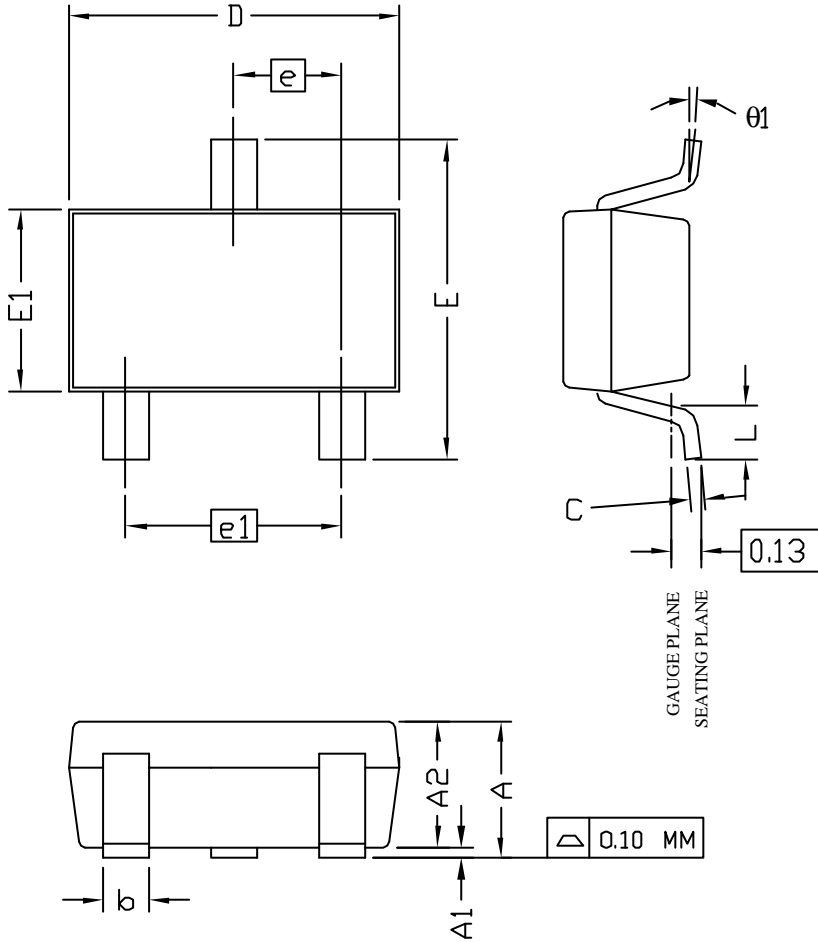


Figure 11: Normalized Maximum Transient Thermal Impedance



**ALPHA & OMEGA**  
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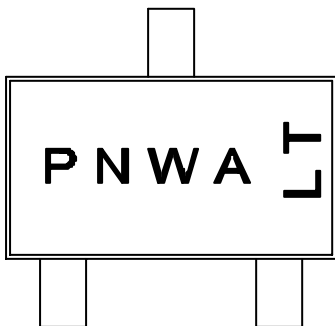
Document No.	PD-00059
Version	rev B
Title	AO3414 Package Data Sheet



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	—	1.25
A1	0.00	—	0.10
A2	1.00	1.10	1.15
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.80	2.90	3.04
E	2.60	2.80	2.95
E1	1.40	1.60	1.80
e	—	0.95 BSC	—
e1	—	1.90 BSC	—
L	0.40	—	0.60
theta1	1°	5°	8°

- NOTE:
- LEAD FINISH: 150 MICRONS ( 3.8 um) MIN.  
THICKNESS OF Tin/Lead (SOLDER) PLATED ON LEAD
  - TOLERANCE ± 0.10 mm (4 mil) UNLESS OTHERWISE SPECIFIED
  - COPLANARITY : 0.10 mm
  - DIMENSION L IS MEASURED IN GAGE PLANE

PACKAGE MARKING DESCRIPTION

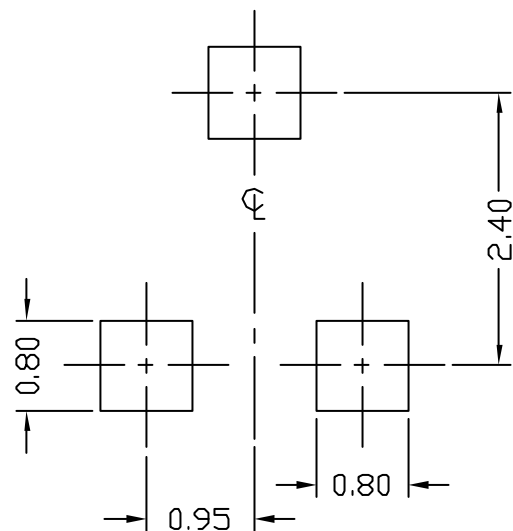


SOT-23 PART NO. CODE

PART NO.	CODE
AO3414	AE

- NOTE:
- P - Package and product type.
  - N - Last digital of product number.
  - W - Week code
  - A - Foundry location code
  - LT - Assembly lot code.

RECOMMENDATION OF LAND PATTERN

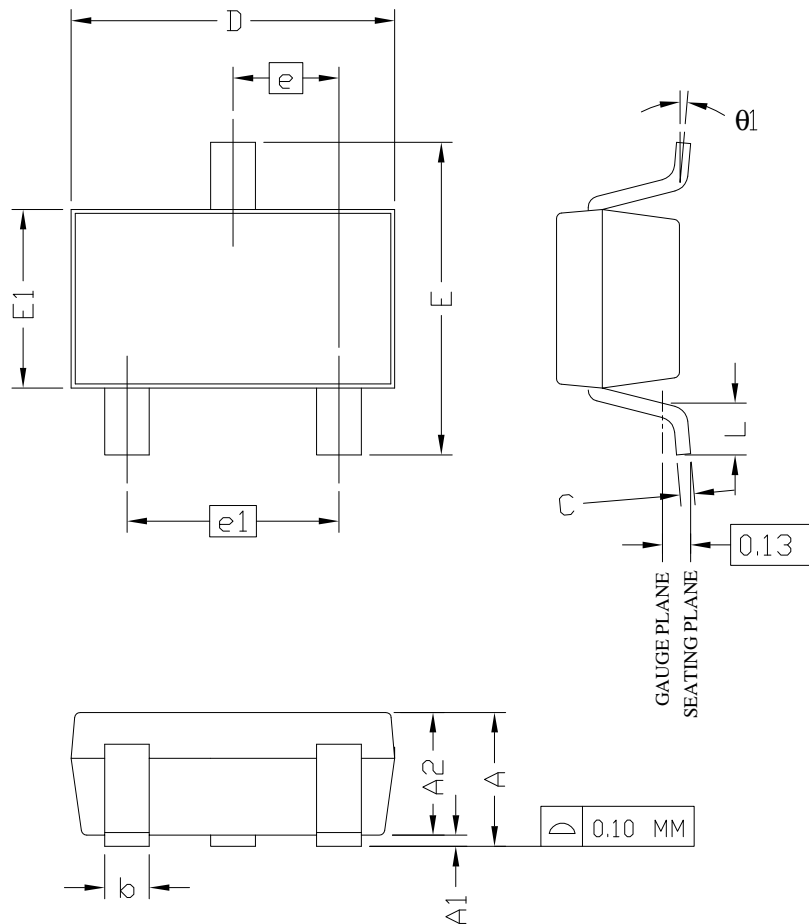




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SEMICONDUCTOR, INC.

Document No.	PD-00159
Version	rev A
Title	AO3414L Package Data Sheet

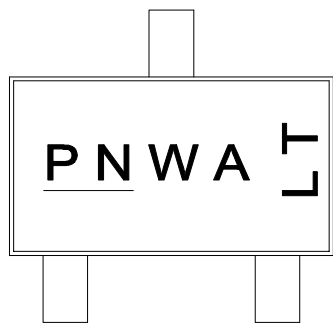
**SOT-23 LEAD FREE**



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	—	1.25
A1	0.00	—	0.10
A2	1.00	1.10	1.15
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.80	2.90	3.04
E	2.60	2.80	2.95
E1	1.40	1.60	1.80
e	—	0.95 BSC	—
e1	—	1.90 BSC	—
L	0.40	—	0.60
$\theta 1$	1°	5°	8°

- NOTE:  
 1. LEAD FINISH: LEAD FREE COATING  
 2. TOLERANCE  $\pm 0.10$  mm (4 mil) UNLESS OTHERWISE SPECIFIED  
 3. COPLANARITY : 0.10 mm  
 4. DIMENSION L IS MEASURED IN GAGE PLANE

PACKAGE MARKING DESCRIPTION

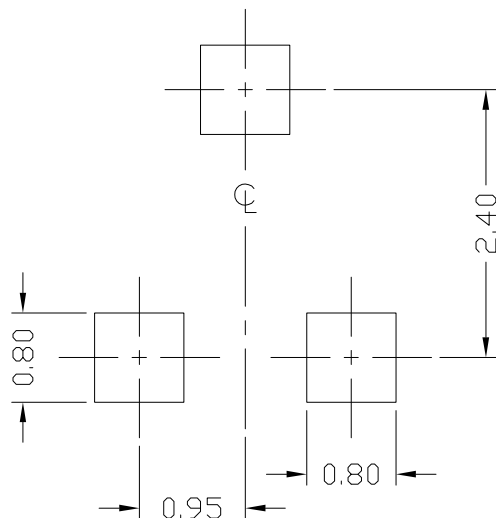


SOT-23 PART NO. CODE

PART NO.	CODE
AO3414L	AE

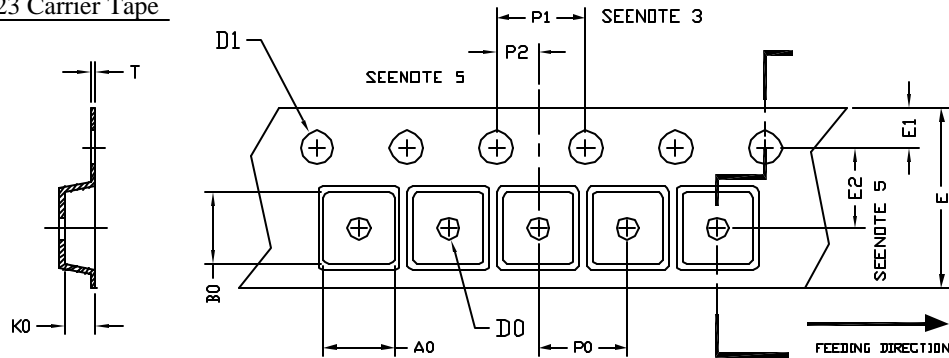
- NOTE:  
 P - Package and product type,Lead\_Free.  
 N - Last digital of product number.  
 W - Week code  
 A - Foundry location code  
 LT - Assembly lot code.

RECOMMENDATION OF LAND PATTERN





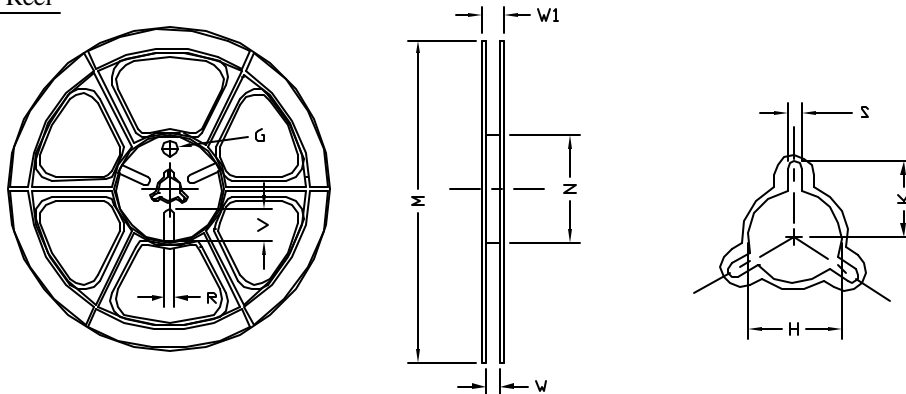
SOT-23 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOT-23 (8 mm)	3.15 ±0.10	3.20 ±0.10	1.40 ±0.10	1.00 MIN	1.30 +0.10	8.00 ±0.30	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.25 ±0.05

SOT-23 Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	φ180	φ180.00 ±0.50	φ60.50	9.00 ±0.30	11.40 ±1.00	φ13.00 +0.50 -0.20	10.60	2.00 ±0.50	φ9.00	5.00	18.00

SOT-23 Tape

Leader / Trailer  
& Orientation

