



General Description

- Trench Power MOSFET technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- RoHS and Halogen-Free Compliant

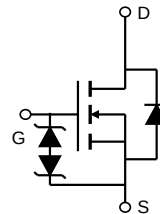
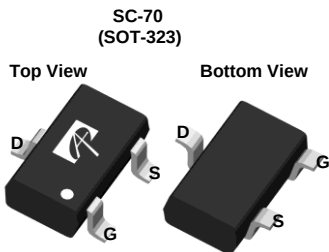
Applications

- Ideal for Load Switching

Product Summary

V_{DS}	30V
I_D (at $V_{GS}=10V$)	3.7A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 51m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 56m Ω
$R_{DS(ON)}$ (at $V_{GS}=2.5V$)	< 72m Ω

ESD protection



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOSN32338C	SC70-3	Tape & Reel	3000

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	I_D	3.7	A
$T_A=25^\circ\text{C}$			
Current		2.9	
$T_A=70^\circ\text{C}$			
Pulsed Drain Current ^C	I_{DM}	20	
Power Dissipation ^B	P_D	1.1	W
$T_A=25^\circ\text{C}$			
		0.7	
$T_A=70^\circ\text{C}$			
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	90	110	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^{A,D}		110	135	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead	$R_{\theta JL}$	60	72	$^\circ\text{C/W}$
Steady-State				

Electrical Characteristics (T_j=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=250μA, VGS=0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, VGS=0V T _j =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, VGS=±12V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =VGS, ID=250μA	0.5	1	1.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	VGS=10V, ID=3.7A T _j =125°C		42 58	51 70	mΩ
		VGS=4.5V, ID=3.5A		42	56	mΩ
		VGS=2.5V, ID=3.1A		54	72	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, ID=3.7A		20		S
V _{SD}	Diode Forward Voltage	IS=1A, VGS=0V		0.7	1	V
IS	Maximum Body-Diode Continuous Current				1	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	VGS=0V, VDS=15V, f=1MHz		340		pF
C _{oss}	Output Capacitance			30		pF
C _{rss}	Reverse Transfer Capacitance			25		pF
R _g	Gate resistance	f=1MHz	4	8	12	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	VGS=10V, VDS=15V, ID=3.7A		8	16	nC
Q _{g(4.5V)}	Total Gate Charge			4	8	nC
Q _{gs}	Gate Source Charge			1		nC
Q _{gd}	Gate Drain Charge			1.2		nC
t _{D(on)}	Turn-On DelayTime	VGS=10V, VDS=15V, RL=4.05Ω, RGEN=3Ω		2.5		ns
t _r	Turn-On Rise Time			3		ns
t _{D(off)}	Turn-Off DelayTime			30		ns
t _f	Turn-Off Fall Time			5		ns
t _{rr}	Body Diode Reverse Recovery Time	IF=3.7A, di/dt=500A/μs		5.5		ns
Q _{rr}	Body Diode Reverse Recovery Charge	IF=3.7A, di/dt=500A/μs		4		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{j(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{j(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_j=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{j(MAX)}=150° C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

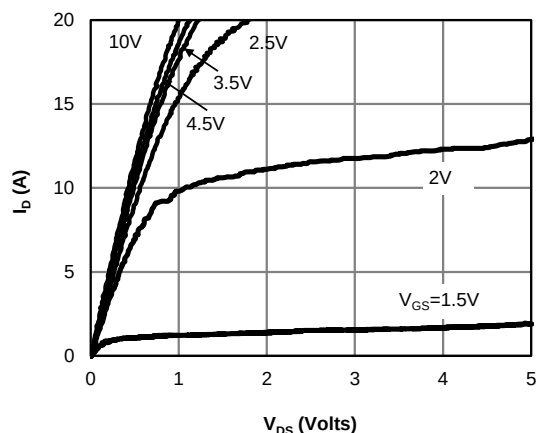


Figure 1: On-Region Characteristics (Note E)

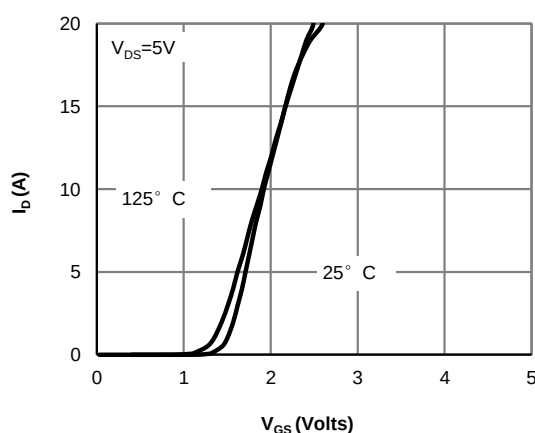


Figure 2: Transfer Characteristics (Note E)

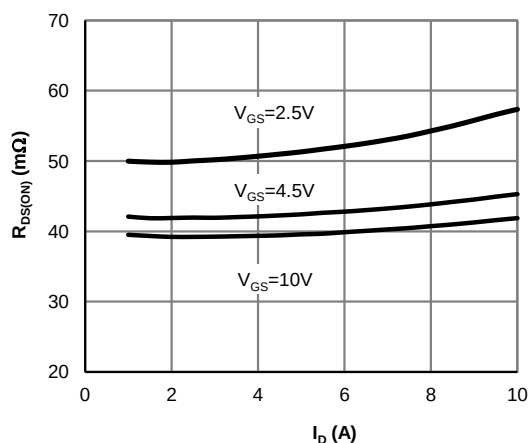


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

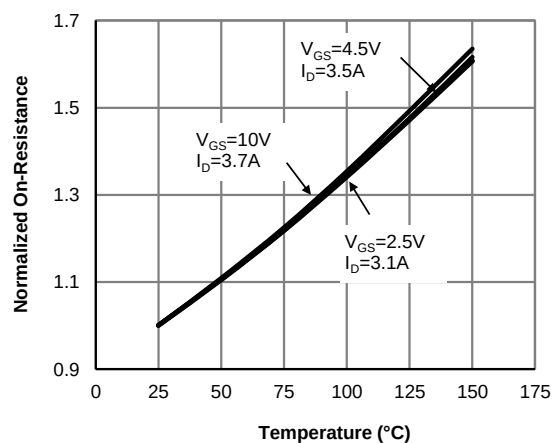


Figure 4: On-Resistance vs. Junction Temperature (Note E)

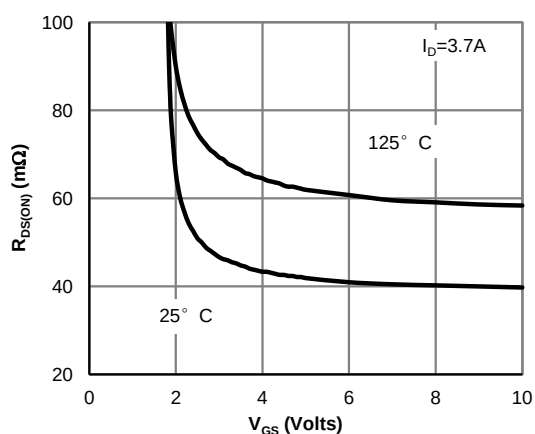


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

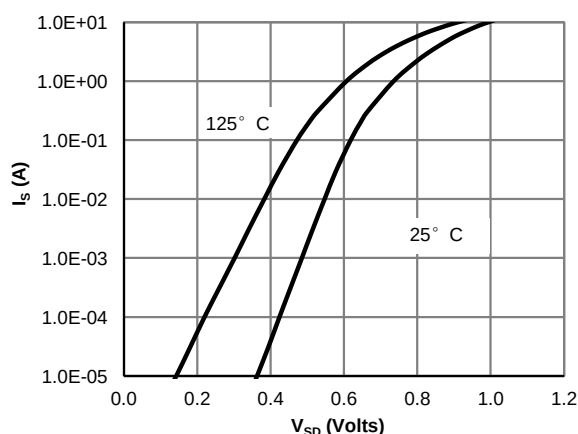


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

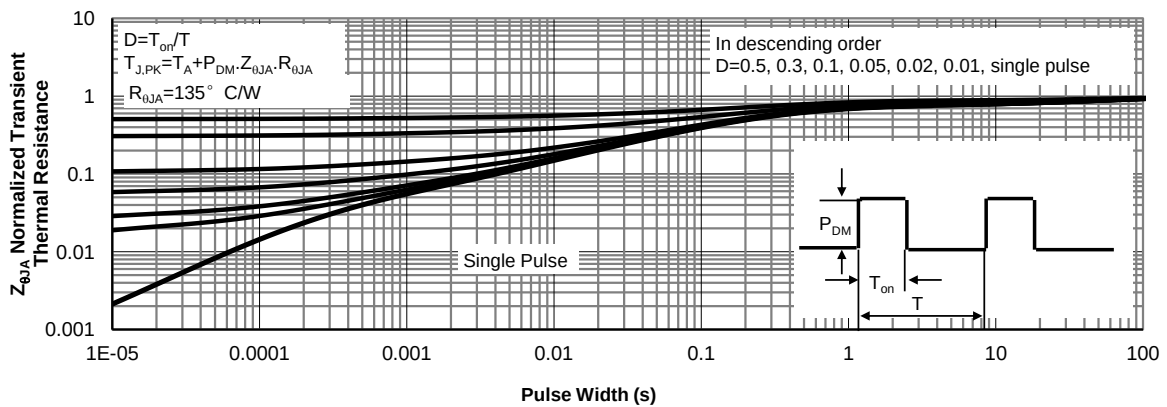
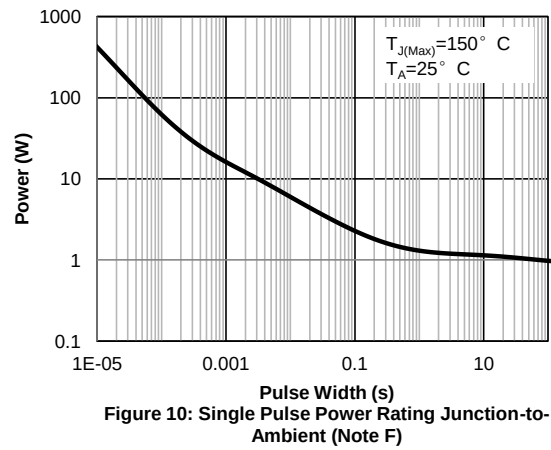
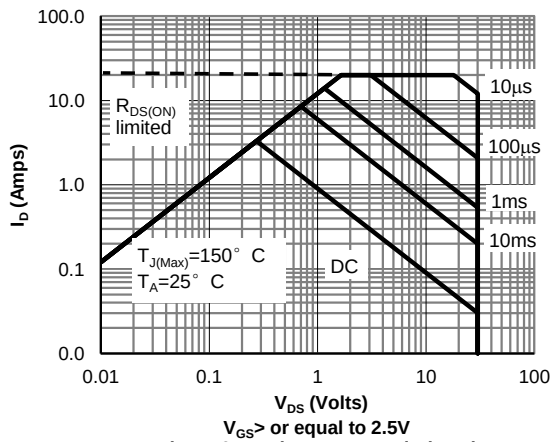
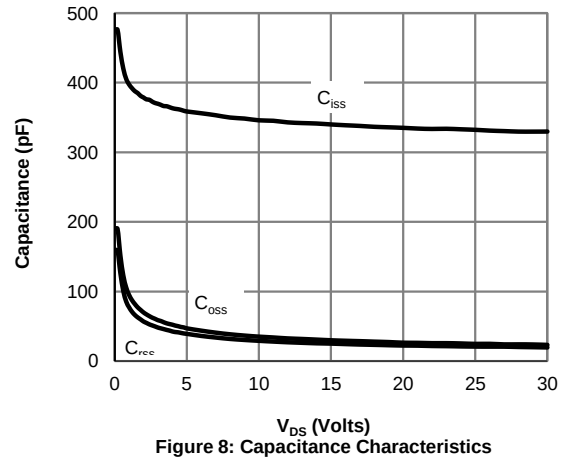
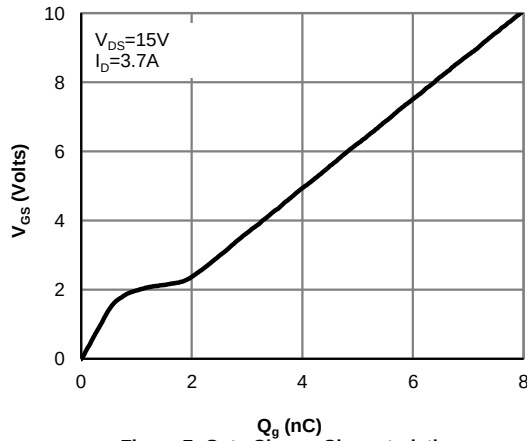


Figure A: Gate Charge Test Circuit & Waveforms

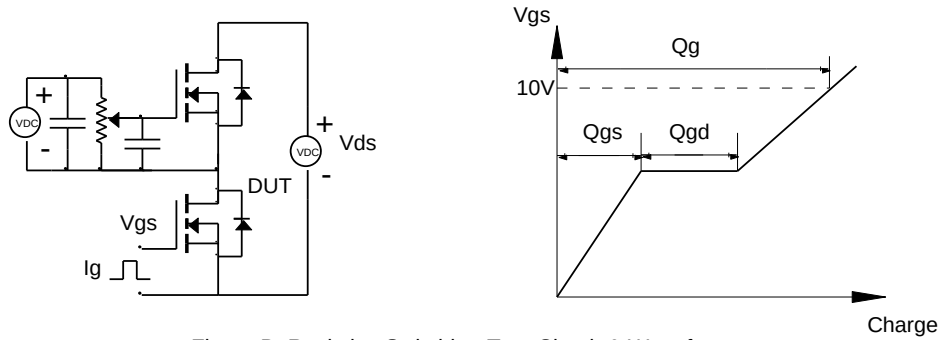


Figure B: Resistive Switching Test Circuit & Waveforms

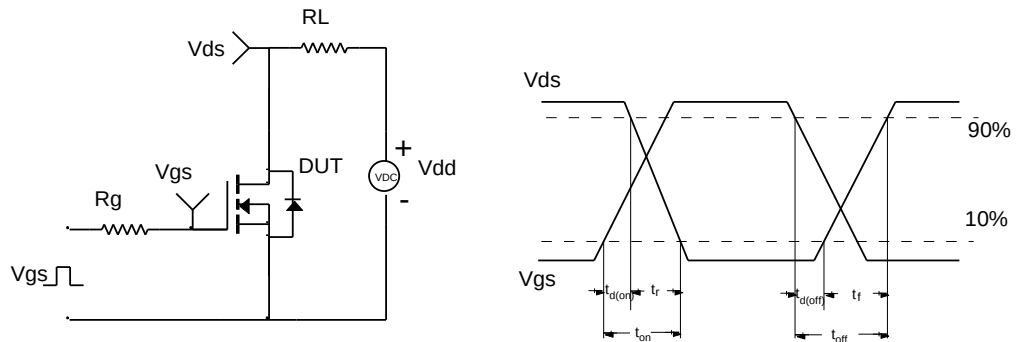


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

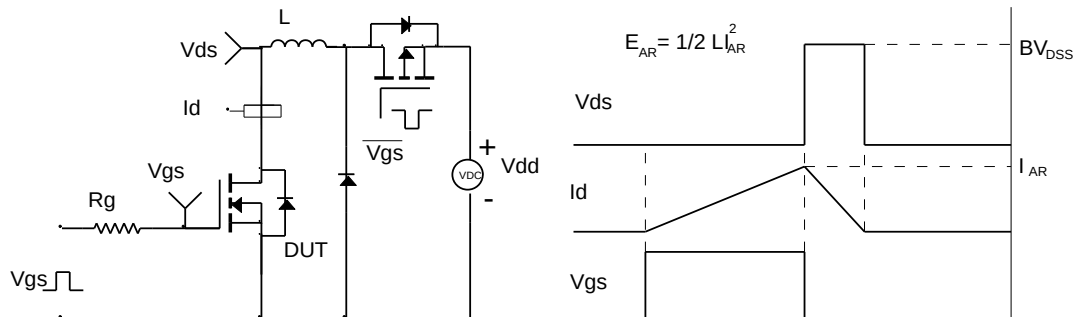
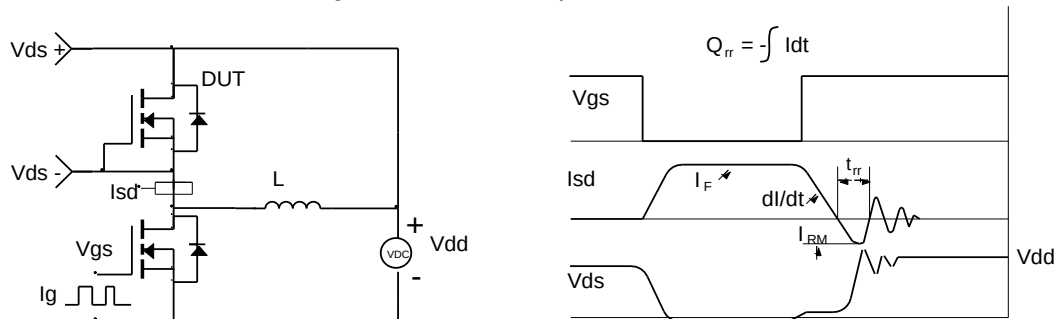


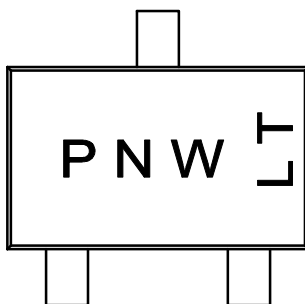
Figure D: Diode Recovery Test Circuit & Waveforms





Document No.	PD-03187
Version	A
Title	AOSN32338C Marking Description

SC70 PACKAGE MARKING DESCRIPTION



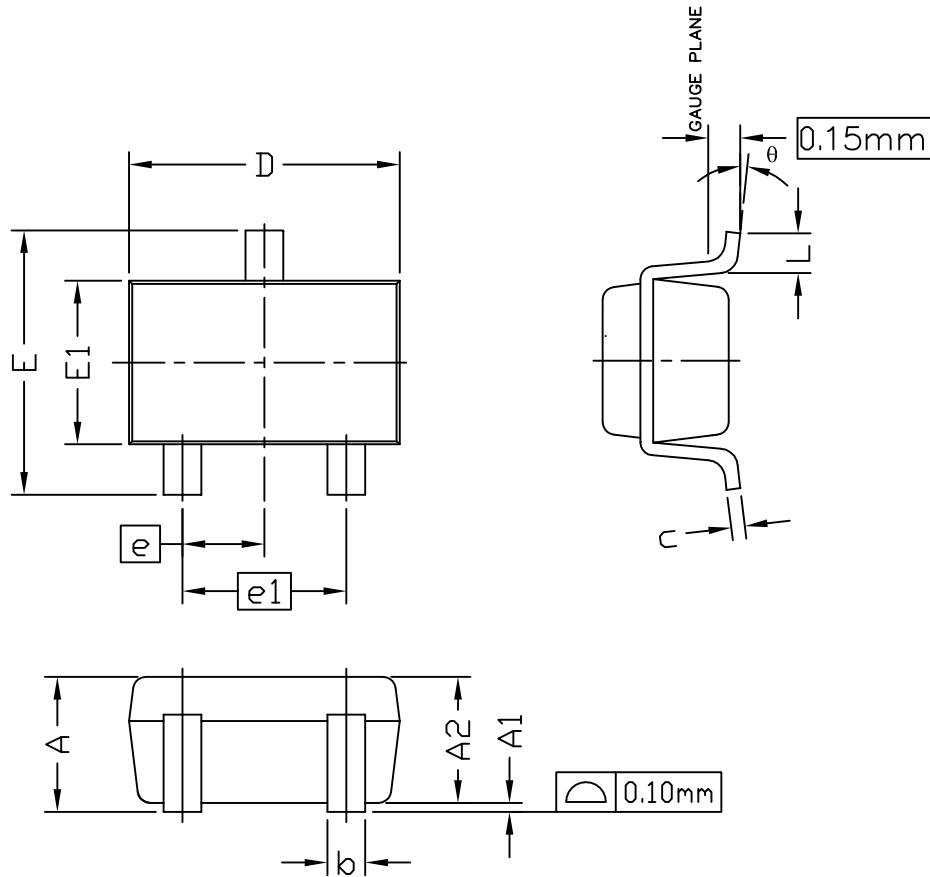
Green product

NOTE:

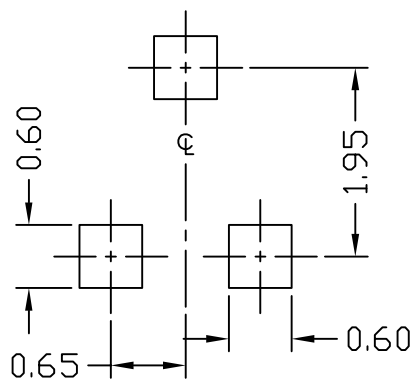
P - Product number code
N - Assembly location code
W - Year and Week code
LT - Assembly lot code

PART NO.	DESCRIPTION	CODE (P)
AOSN32338C	Green product	0

SC70 PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

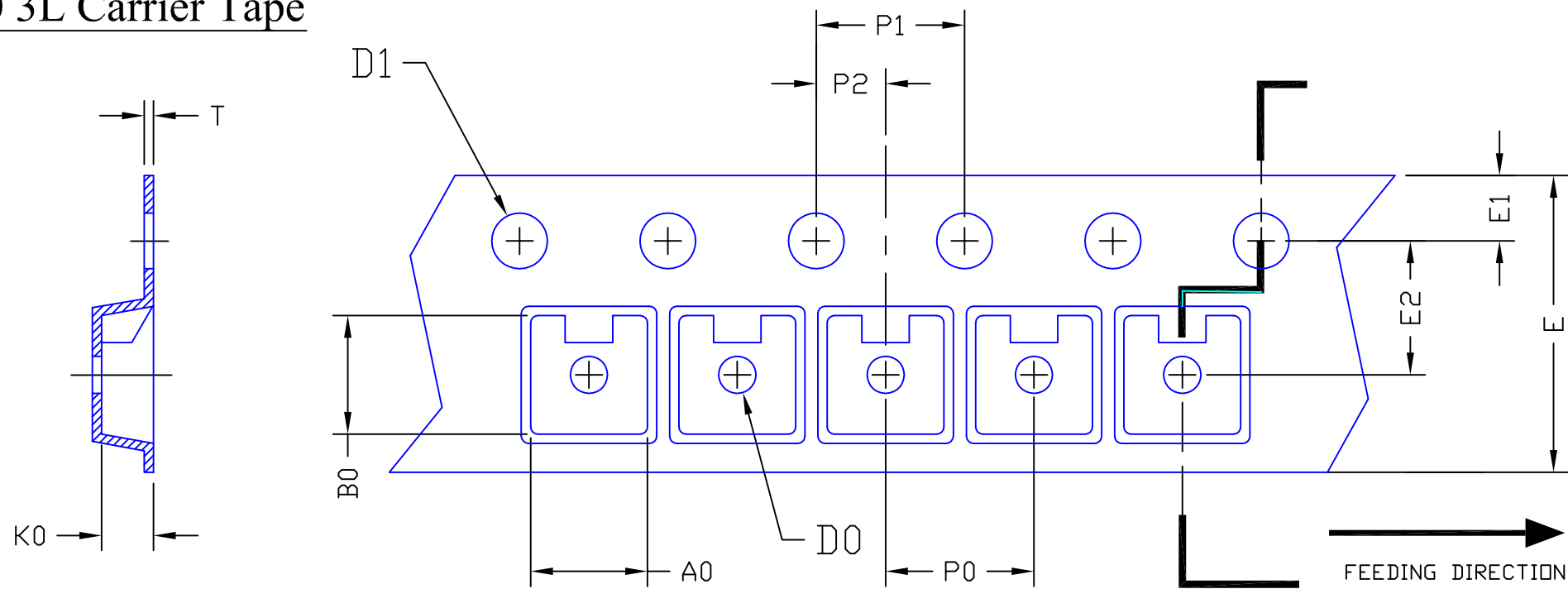
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	0.95	1.10	0.035	0.037	0.043
A1	0.00	—	0.10	0.00	—	0.004
A2	0.7	0.90	1.00	0.028	0.035	0.039
b	0.15	0.22	0.30	0.006	0.009	0.012
c	0.08	0.127	0.22	0.003	0.005	0.009
D	1.85	2.10	2.15	0.073	0.083	0.085
E	1.80	2.30	2.40	0.071	0.091	0.094
e	0.65 BSC			0.026 BSC		
e1	1.30 BSC			0.051 BSC		
E1	1.1	1.30	1.4	0.043	0.051	0.055
L	0.26	0.36	0.46	0.010	0.014	0.018
θ	0°	4°	8°	0°	4°	8°

NOTE

- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE INCLUSIVE OF PLATING.
- PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 3 MILS EACH.
- DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM.
ie: REVERSE TRIM/FORM.
- DIMENSION L IS MEASURED IN GAUGE PLANE.
- CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.



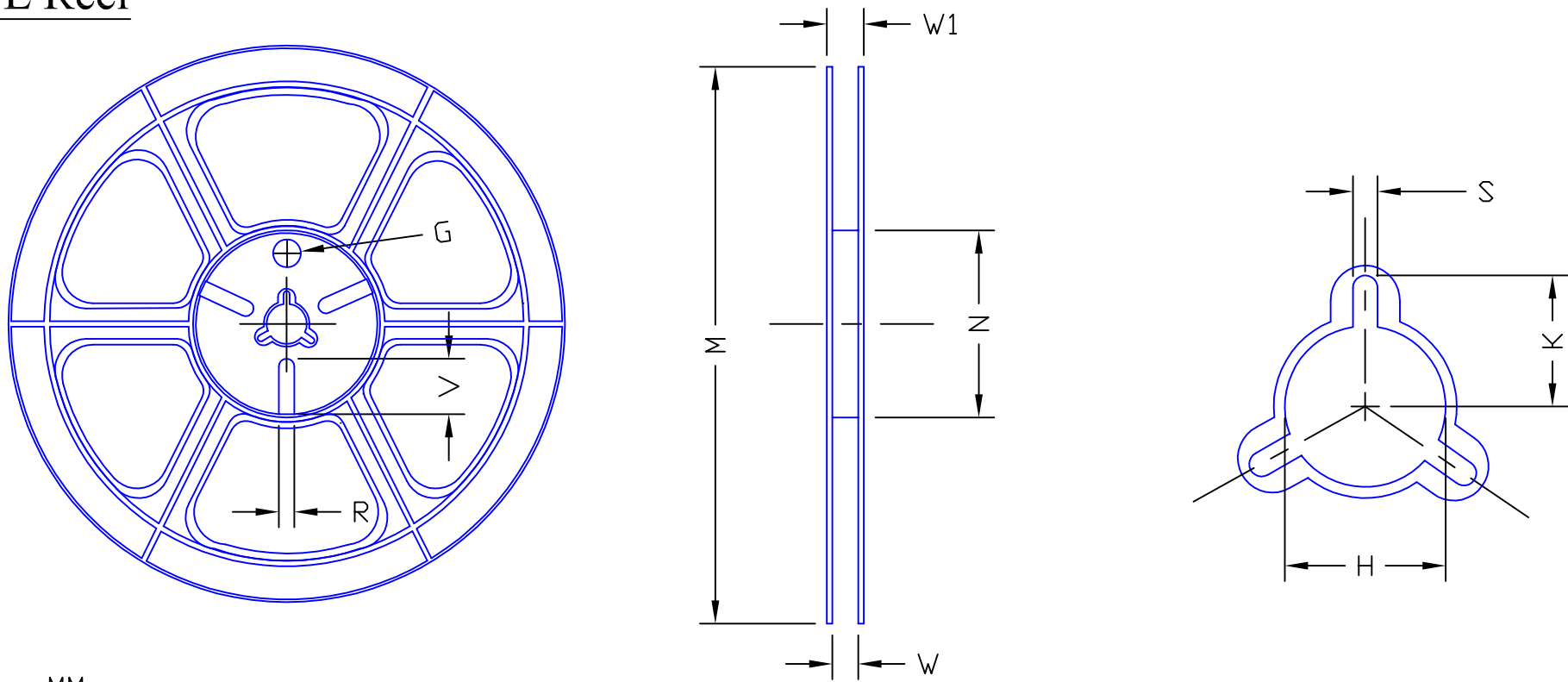
SC-70 3L Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SC70-3L (8 mm)	2.40 ±0.10	2.60 ±0.10	1.20 ±0.10	1.00 MIN	1.50 +0.10	8.00 +0.30 -0.10	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.20 ±0.02

SC-70 3L Reel



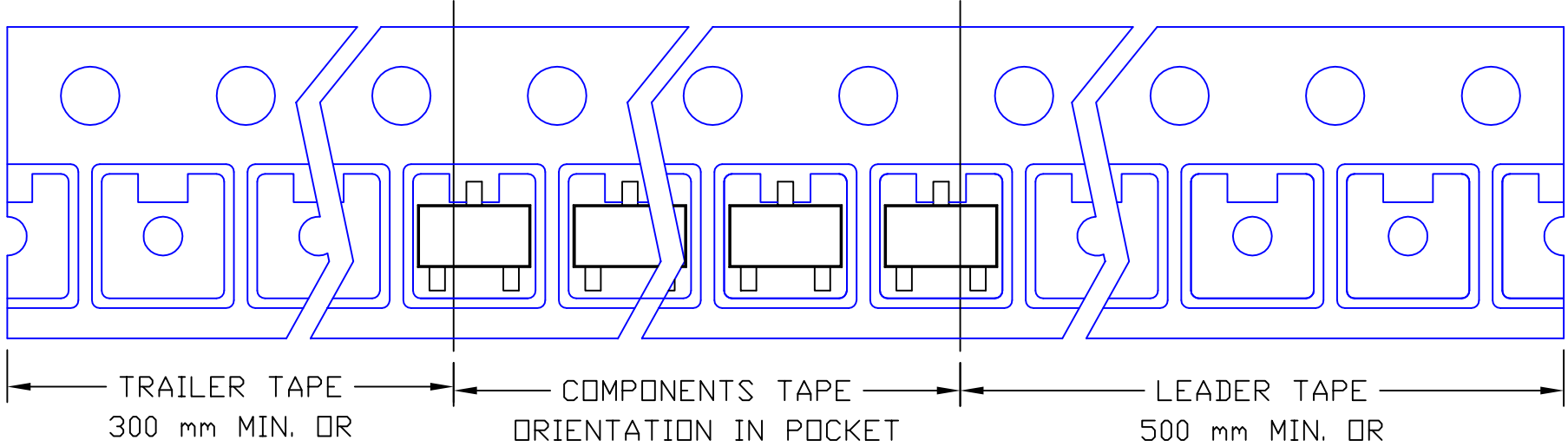
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	ø178	ø178.00 ±1.00	ø54 ±0.50	9.50 ±0.50	11.30 ±1.00	ø13.00 +0.50 -0.20	10.60	2.00 ±0.50	ø9.00	5.00	18.00

SC-70 3L Tape

Leader / Trailer
& Orientation

Unit Per Reel:
3000pcs





AOS Semiconductor Product Reliability Report

AOSN32338C, rev A

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

Apr, 2019

This AOS product reliability report summarizes the qualification result for AOSN32338C. Accelerated environmental tests are performed on a specific sample size, and then followed by electrical test at end point. Review of final electrical test result confirms that AOSN32338C passes AOS quality and reliability requirements. The released product will be categorized by the process family and be routine monitored for continuously improving the product quality.

I. Reliability Stress Test Summary and Results

Test Item	Test Condition	Time Point	Total Sample Size	Number of Failures	Reference Standard
HTGB	Temp = 150°C , Vgs=100% of Vgsmax	168 / 500 / 1000 hours	462 pcs	0	JESD22-A108
HTRB	Temp = 150°C , Vds=100% of Vdsmax	168 / 500 / 1000 hours	462 pcs	0	JESD22-A108
Precondition (Note A)	168hr 85°C / 85%RH + 3 cycle reflow@260°C (MSL 1)	-	4620 pcs	0	JESD22-A113
HAST	130°C , 85%RH, 33.3 psia, Vds = 80% of Vdsmax	96 hours	693 pcs	0	JESD22-A110
H3TRB	85°C , 85%RH, Vds = 80% of Vdsmax	1000 hours	693 pcs	0	JESD22-A101
Autoclave	121°C , 29.7psia, RH=100%	96 hours	924 pcs	0	JESD22-A102
Temperature Cycle	-65°C to 150°C , air to air,	1000cycles	924 pcs	0	JESD22-A104
HTSL	Temp = 150°C	1000 hours	693 pcs	0	JESD22-A103
IOL	$\Delta T_j = 100^\circ\text{C}$	15000 cycles	693 pcs	0	MIL-STD-750 Method 1037

Note: The reliability data presents total of available generic data up to the published date.

Note A: MSL (Moisture Sensitivity Level) 1 based on J-STD-020

II. Reliability Evaluation

FIT rate (per billion): 3.82

MTTF = 29919 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size. Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

Failure Rate = $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 3.82$

MTTF = $10^9 / \text{FIT} = 29919$ years

Chi² = Chi Squared Distribution, determined by the number of failures and confidence interval

N = Total Number of units from burn-in tests

H = Duration of burn-in testing

Af = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and Tuse = 55°C)

Acceleration Factor **[Af]** = $\text{Exp} [E_a / k (1/T_j u - 1/T_j s)]$

Acceleration Factor ratio list:

	55 deg C	70 deg C	85 deg C	100 deg C	115 deg C	130 deg C	150 deg C
Af	259	87	32	13	5.64	2.59	1

Tj s = Stressed junction temperature in degree (Kelvin), K = C+273.16

Tj u = The use junction temperature in degree (Kelvin), K = C+273.16

k = Boltzmann's constant, $8.617164 \times 10^{-5} \text{ eV} / \text{K}$