

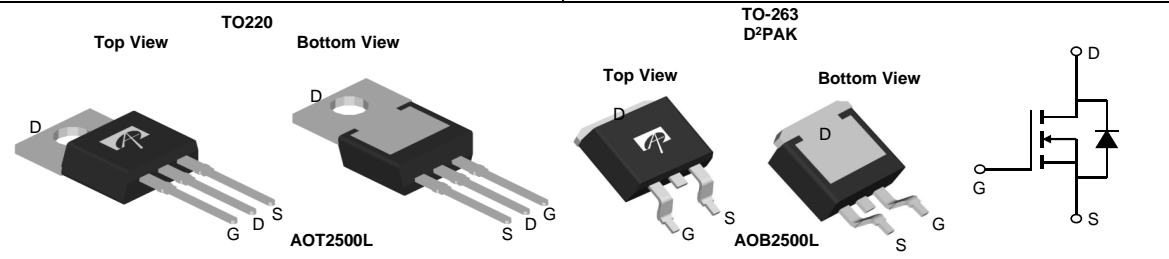
General Description

The AOT2500L/AOB2500L uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$, C_{iss} and C_{oss} . This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

Product Summary

V_{DS}	150V
I_D (at $V_{GS}=10V$)	152A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 6.5m Ω (< 6.2m Ω^*)
$R_{DS(ON)}$ (at $V_{GS}=6V$)	< 7.6m Ω (< 7.3m Ω^*)

100% UIS Tested
 100% R_g Tested



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	152
		$T_C=100^\circ\text{C}$	107
Pulsed Drain Current ^C	I_{DM}	440	A
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	11.5
		$T_A=70^\circ\text{C}$	9.0
Avalanche Current ^C	I_{AS}	65	A
Avalanche energy $L=0.3\text{mH}$ ^C	E_{AS}	634	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	375
		$T_C=100^\circ\text{C}$	187.5
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	2.1
		$T_A=70^\circ\text{C}$	1.3
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	12	15	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A,D}		Steady-State	48	60
Maximum Junction-to-Case	$R_{\theta JC}$	0.26	0.4	$^\circ\text{C}/\text{W}$

* Surface mount package TO263

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	150			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =150V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.3	2.8	3.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A TO220 T _J =125°C		5.4 10.2	6.5 12.3	mΩ
		V _{GS} =6V, I _D =20A TO220		5.9	7.6	mΩ
		V _{GS} =10V, I _D =20A TO263		5.1	6.2	mΩ
		V _{GS} =6V, I _D =20A TO263		5.6	7.3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		70		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.66	1	V
I _S	Maximum Body-Diode Continuous Current				152	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =75V, f=1MHz		6460		pF
C _{oss}	Output Capacitance			586		pF
C _{rss}	Reverse Transfer Capacitance			22		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1	2.1	3.2	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =75V, I _D =20A		97	136	nC
Q _{gs}	Gate Source Charge			22.5		nC
Q _{gd}	Gate Drain Charge			17		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =75V, R _L =3.75Ω, R _{GEN} =3Ω		18.5		ns
t _r	Turn-On Rise Time			20		ns
t _{D(off)}	Turn-Off Delay Time			67.5		ns
t _f	Turn-Off Fall Time			14		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		90		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		1090		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 Power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175° C may be used if the PCB allows it.

B. The power dissipation P_D is based on T_{J(MAX)}=175° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=175° 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 case R_{θJC} and case 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-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175° C. The SOA curve provides a single pulse rating.

G. The maximum current limited by package.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

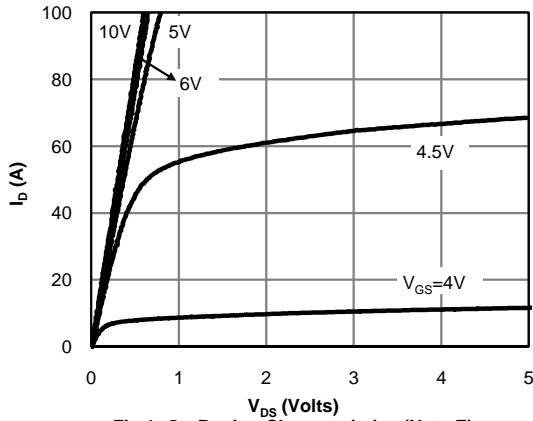


Fig 1: On-Region Characteristics (Note E)

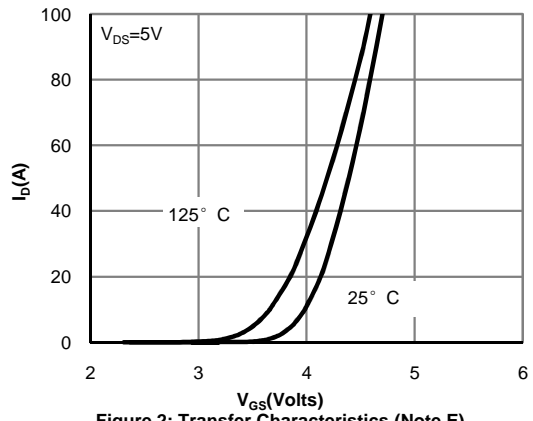


Figure 2: Transfer Characteristics (Note E)

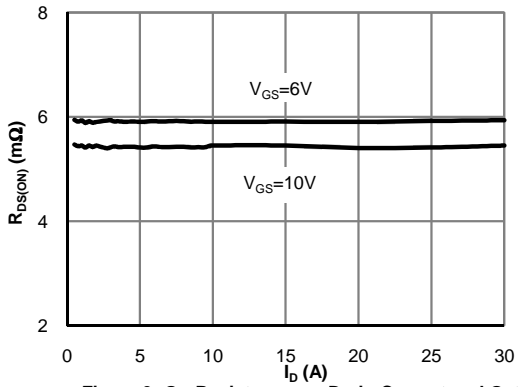


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

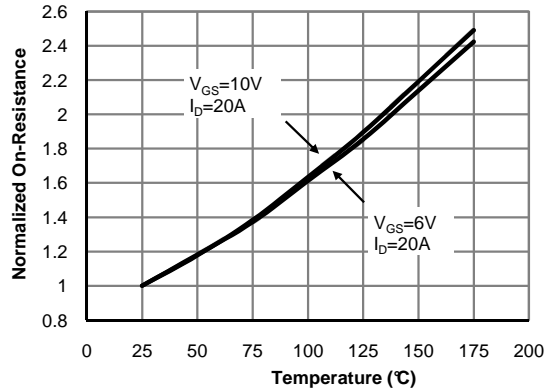


Figure 4: On-Resistance vs. Junction Temperature (Note E)

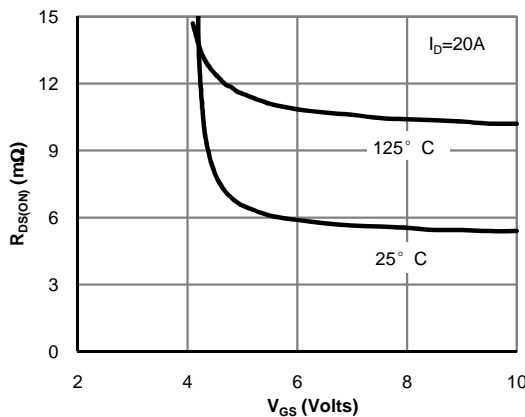


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

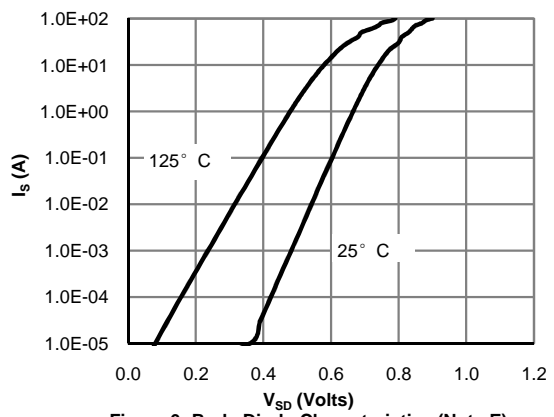


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

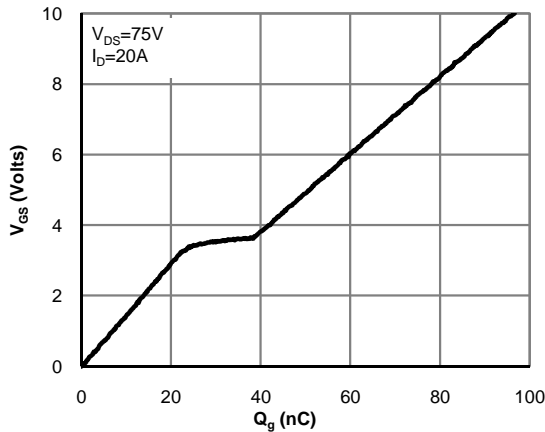


Figure 7: Gate-Charge Characteristics

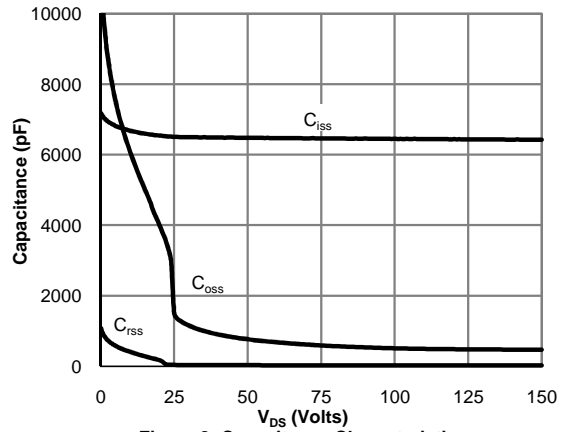


Figure 8: Capacitance Characteristics

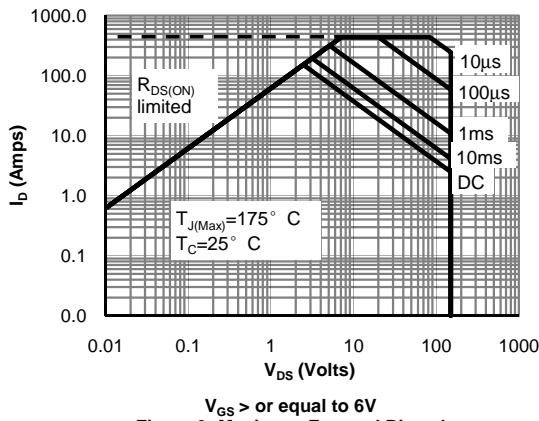


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

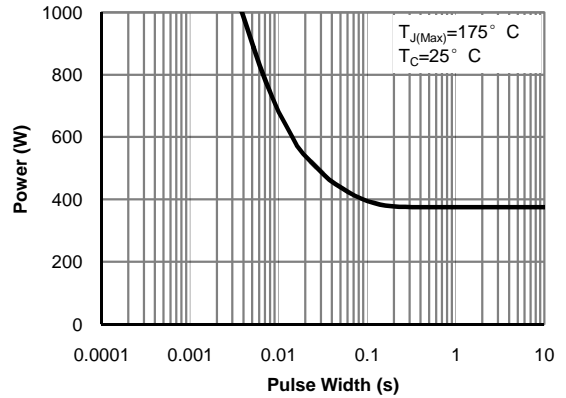


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

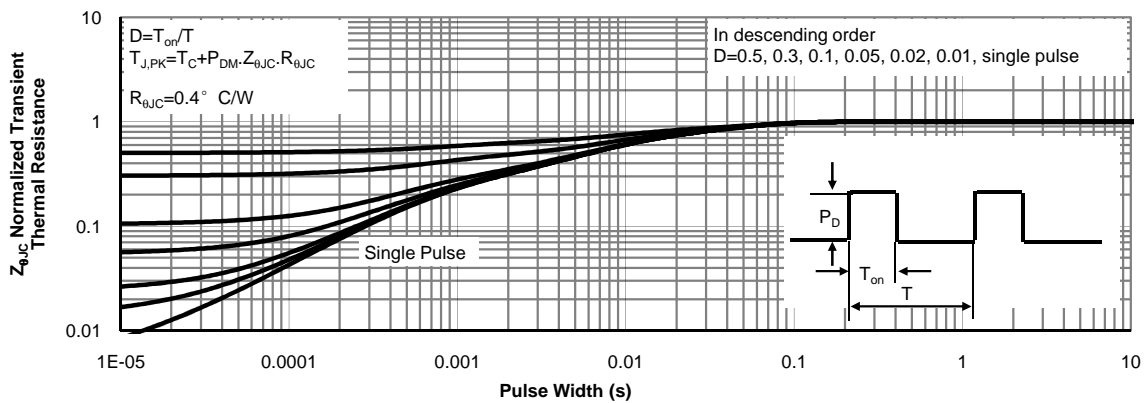


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

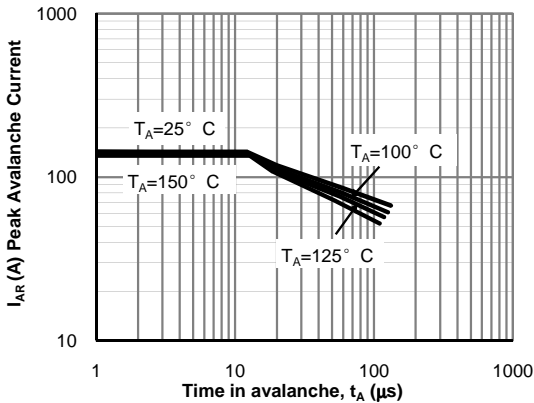


Figure 12: Single Pulse Avalanche capability (Note C)

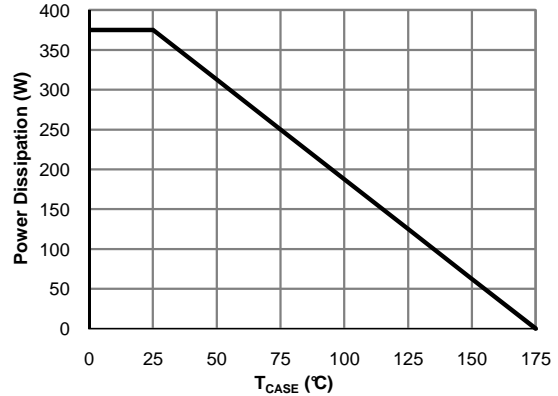


Figure 13: Power De-rating (Note F)

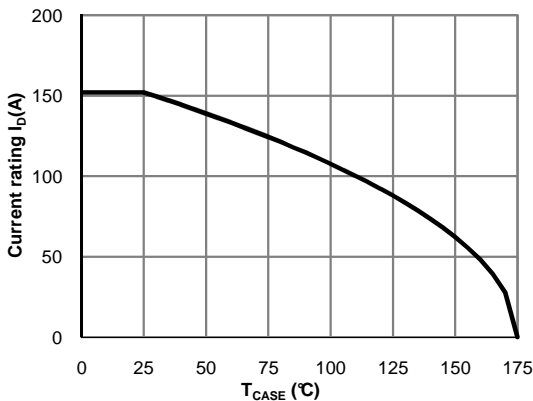


Figure 14: Current De-rating (Note F)

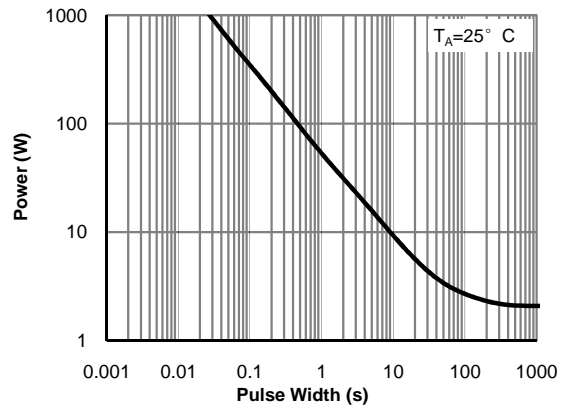


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

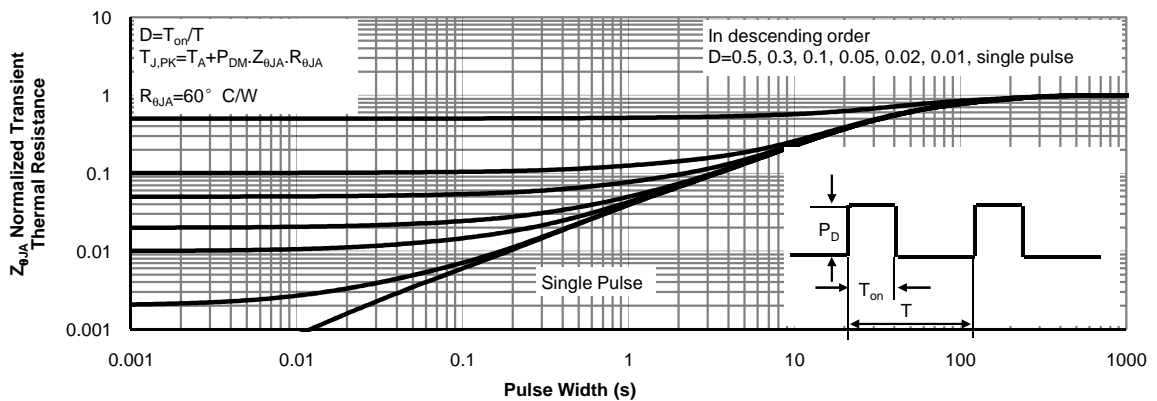
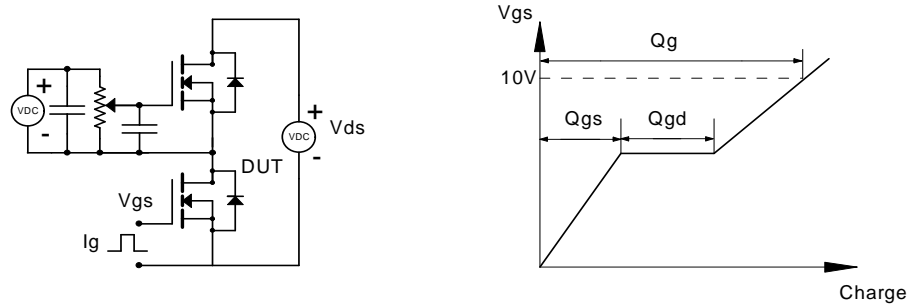
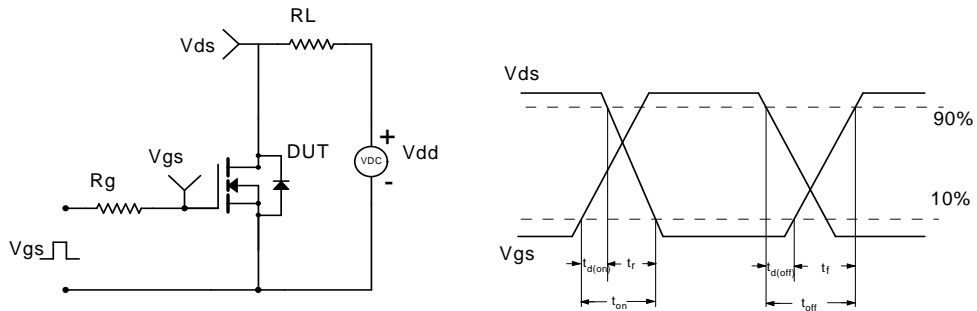


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

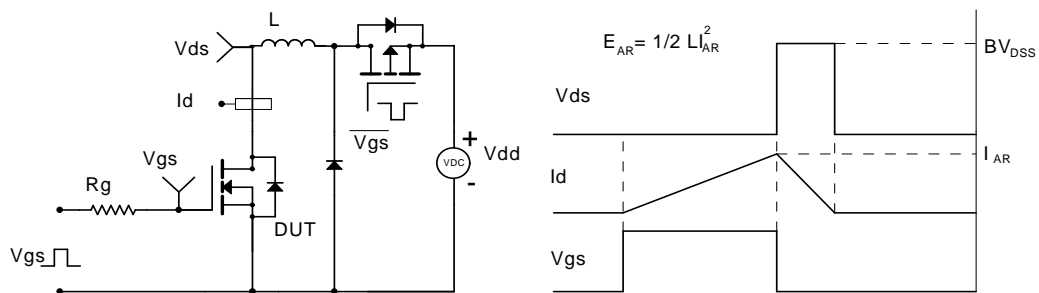
Gate Charge Test Circuit & Waveform



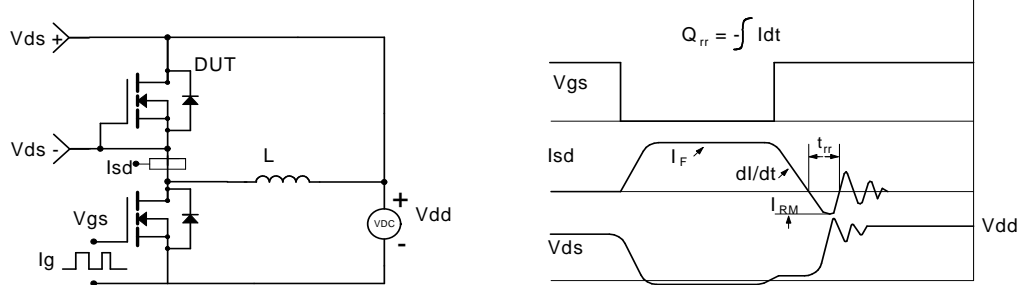
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



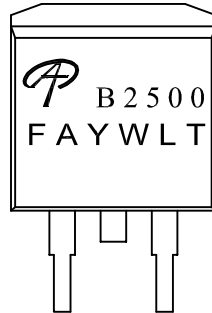
Diode Recovery Test Circuit & Waveforms



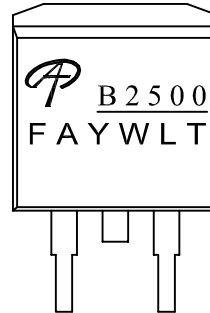


Document No.	PD-01928
Version	A
Title	AOB2500 Marking Description

TO263(D2PAK) PACKAGE MARKING DESCRIPTION



Standard product



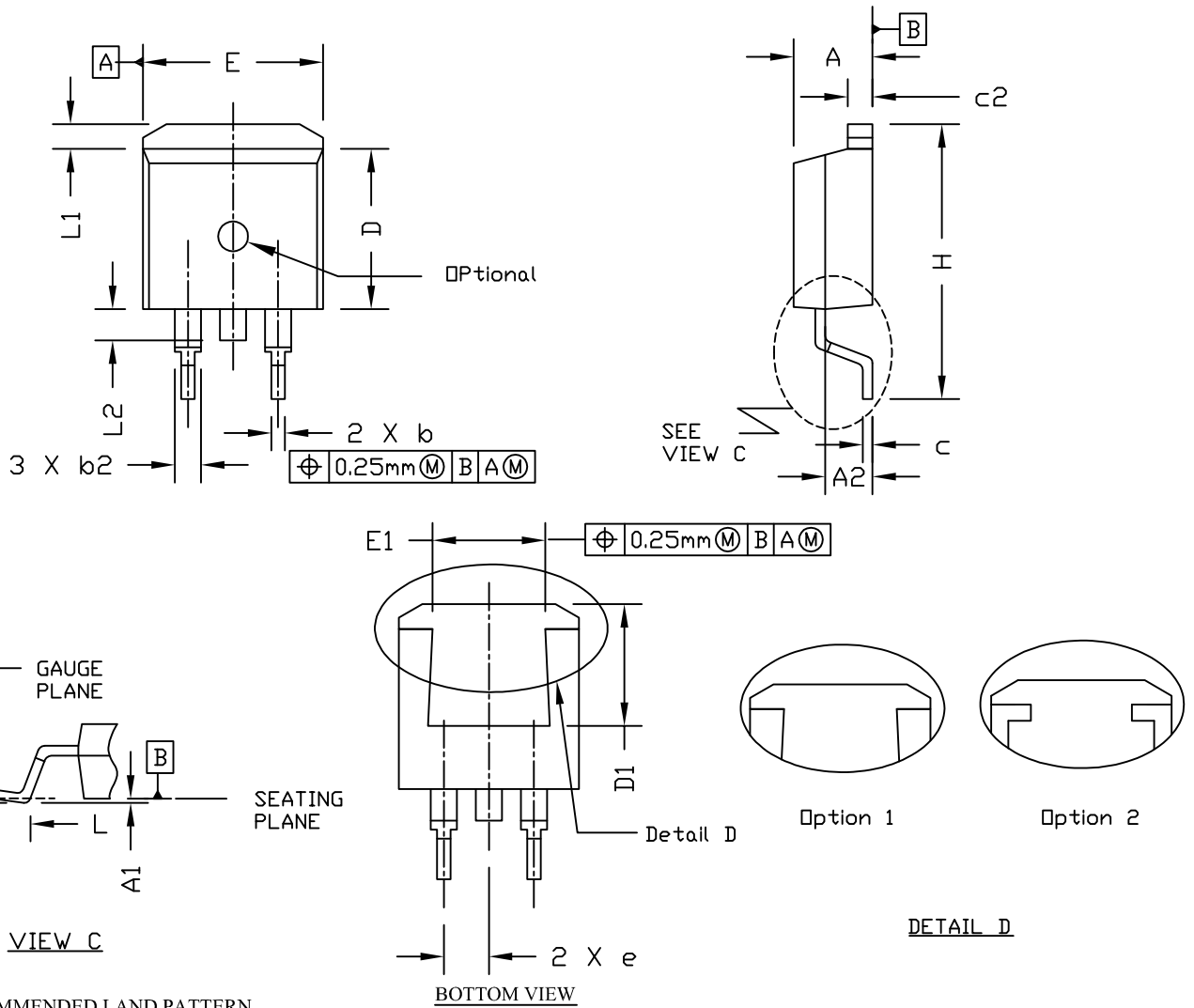
Green product

NOTE:	
LOGO	- AOS Logo
B2500	- Part number code
F	- Fab code
A	- Assembly location code
Y	- Year code
W	- Week code
L&T	- Assembly lot code

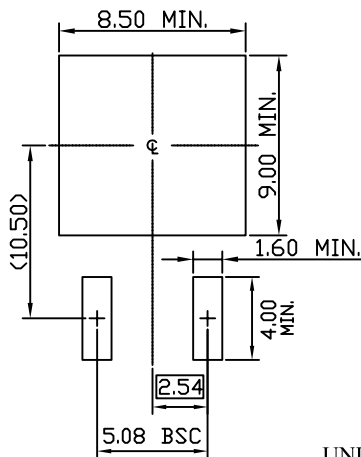
PART NO.	DESCRIPTION	CODE
AOB2500	Standard product	B2500
AOB2500L	Green product	<u>B2500</u>



T0263(D2PAK) PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.064	4.45	4.826	0.160	0.175	0.190
A1	0.00	---	0.254	0.000	---	0.010
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.508	0.81	0.991	0.020	0.032	0.039
b2	1.143	1.27	1.778	0.045	0.050	0.070
c	0.381	0.50	0.737	0.015	0.020	0.029
c2	1.143	1.27	1.651	0.045	0.050	0.065
D	8.382	9.14	9.652	0.330	0.360	0.380
D1	6.858	8.00	8.37	0.270	0.315	0.330
e	2.54 BSC			0.100 BSC.		
E	9.652	10.03	10.668	0.380	0.395	0.420
E1	6.223	8.00	8.37	0.245	0.315	0.330
H	14.605	15.24	15.875	0.575	0.600	0.625
L	1.778	2.54	2.794	0.070	0.100	0.110
L1	1.02	1.27	1.676	0.040	0.050	0.066
L2	1.27	1.52	1.778	0.050	0.060	0.070
L3	0.25 BSC			0.010 BSC.		

NOTE:

- PACKAGE BODY SIDES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MILS.
- TOLERANCE 0.10 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- DIMENSION L IS MEASURED IN GAUGE LINE.
- CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
- REFER TO JEDEC TO-263 AB.



AOS Semiconductor Product Reliability Report

AOB2500L, rev B

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

Nov. 2017

This AOS product reliability report summarizes the qualification result for AOB2500L. 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 AOB2500L 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@245°C (MSL 1)	-	4620 pcs	0	JESD22-A113
HAST	130°C , 85%RH, 33.3 psia, Vds = 80% of Vdsmax up to 42V	96 hours	693 pcs	0	JESD22-A110
H3TRB	85°C , 85%RH, Vds = 80% of Vdsmax up to 100V	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	Δ Tj = 100°C	8572 cycles	693 pcs	0	AEC Q101

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**] = $\text{Exp} [Ea / k (1/Tj u - 1/Tj s)]$

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

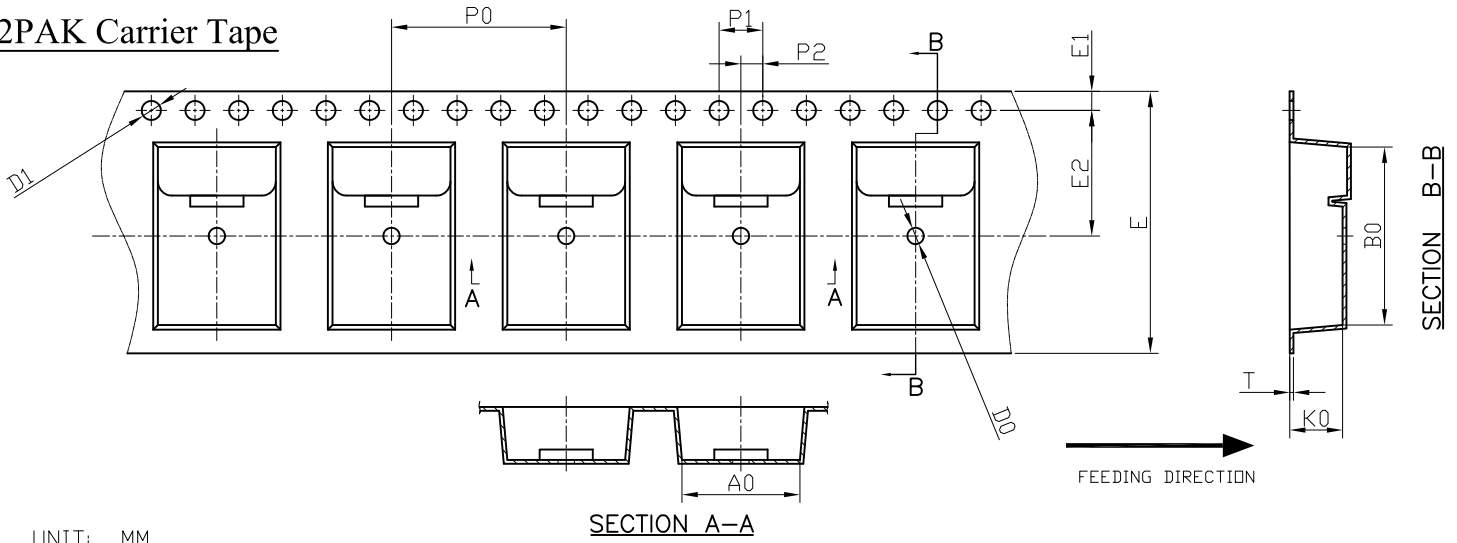
Tj s = Stressed junction temperature in degree (Kelvin), K = C+273.16

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

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



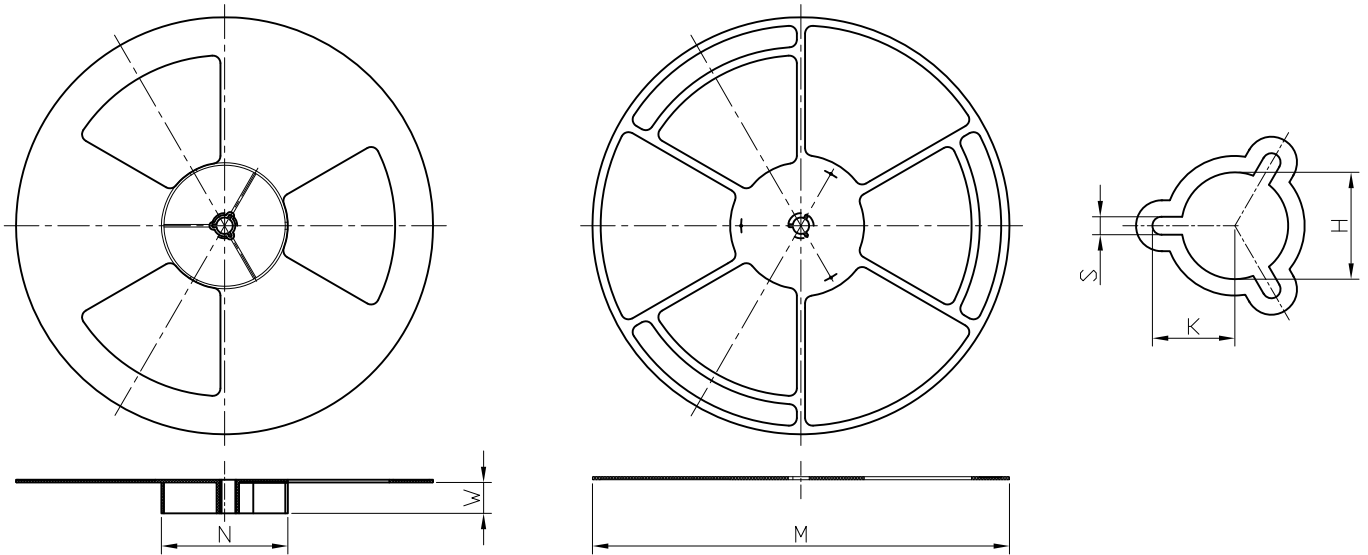
D2PAK Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
D2PAK (24 mm)	10.80 ±0.10	16.30 ±0.10	4.70 ±0.10	1.50 ±0.10	1.50 +0.1 -0	24.00 ±0.30	1.75 ±0.10	11.50 ±0.10	16.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.35 ±0.10

D2PAK Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	H	K	S
24 mm	ø330	ø330.00 +0.25 -4.00	ø100.00 ±0.2	24.4 +2.0 -0.0	ø13.00 +0.50 -0.20	10.5 ±0.25	2.2 ±0.25

D2PAK Tape

Leader / Trailer
& Orientation

Unit Per Reel:
800pcs

