

General Description

The AON7426 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

RoHS and Halogen-Free Compliant

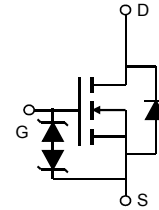
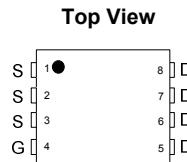
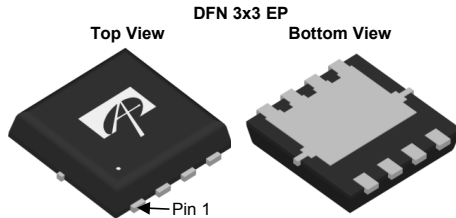
Product Summary

V_{DS}	30V
I_D (at $V_{GS}=10V$)	40A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 5.5m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 8m Ω

Typical ESD protection

100% UIS Tested
 100% R_g Tested

HBM Class 3A



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}	± 20	V
Continuous Drain Current ^G	I_D	$T_C=25^\circ\text{C}$	40
		$T_C=100^\circ\text{C}$	31
Pulsed Drain Current ^C	I_{DM}	130	A
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	18
		$T_A=70^\circ\text{C}$	14
Avalanche Current ^C	I_{AS}, I_{AR}	35	A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	61	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	29
		$T_C=100^\circ\text{C}$	12
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	3.1
		$T_A=70^\circ\text{C}$	2
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	$R_{\theta JA}$	30	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}		Steady-State	60	75
Maximum Junction-to-Case	$R_{\theta JC}$	3.5	4.2	$^\circ\text{C/W}$

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	30	36		V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.35	1.85	2.35	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	130			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =18A T _J =125°C		4.5 7.2	5.5 8.8	mΩ
		V _{GS} =4.5V, I _D =14A		5.8	8	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =18A		75		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				35	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz	1410	1765	2120	pF
C _{oss}	Output Capacitance		195	283	370	pF
C _{riss}	Reverse Transfer Capacitance		90	155	220	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1.3	2.6	3.9	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =18A	26	33	40	nC
Q _{g(4.5V)}	Total Gate Charge		12.5	16	19.5	nC
Q _{gs}	Gate Source Charge			5.2		nC
Q _{gd}	Gate Drain Charge			6.2		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.83Ω, R _{GEN} =3Ω		6		ns
t _r	Turn-On Rise Time			4		ns
t _{D(off)}	Turn-Off DelayTime			33		ns
t _f	Turn-Off Fall Time			7.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A, dI/dt=500A/μs	9.5	12.3	15	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =18A, dI/dt=500A/μs	20	25	30	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} t ≤ 10s value 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 150° C may be used if the PCB allows it.
- B. The power dissipation P_D is based on T_{J(MAX)}=150° 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)}=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 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)}=150° C. The SOA curve provides a single pulse rating.
- G. The maximum current rating is package limited.
- 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

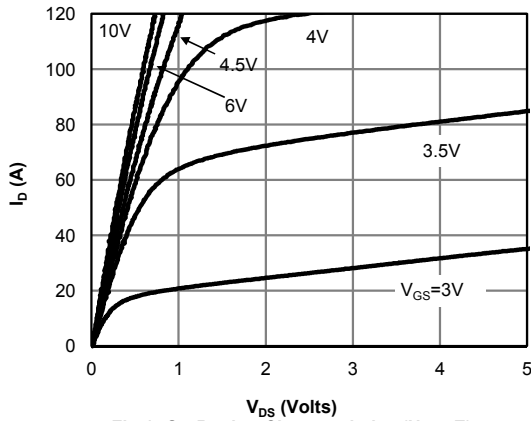


Figure 1: On-Region Characteristics (Note E)

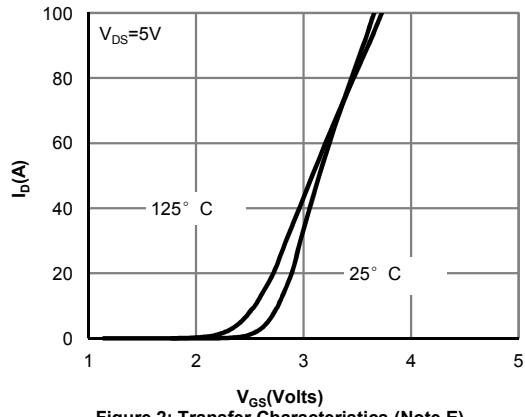


Figure 2: Transfer Characteristics (Note E)

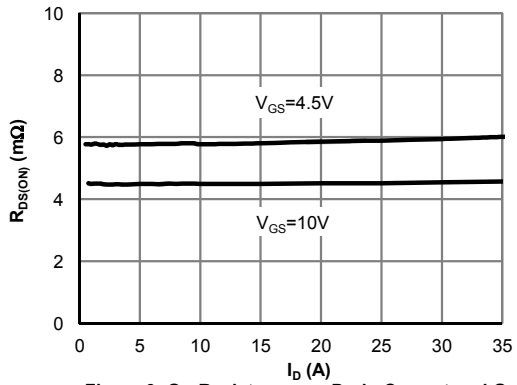


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

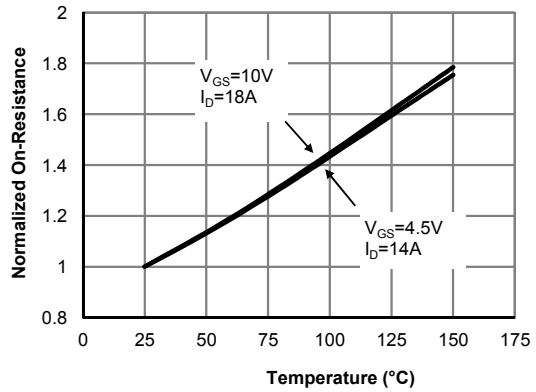


Figure 4: On-Resistance vs. Junction Temperature (Note E)

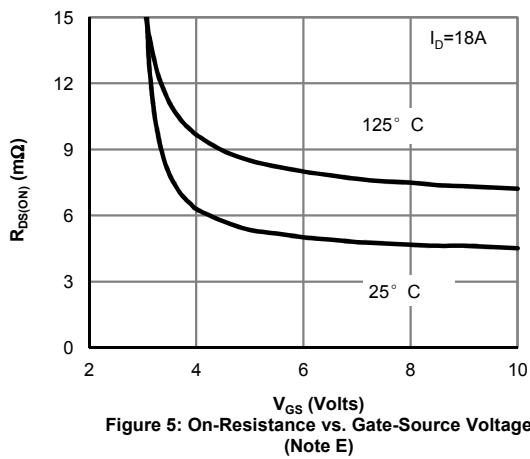


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

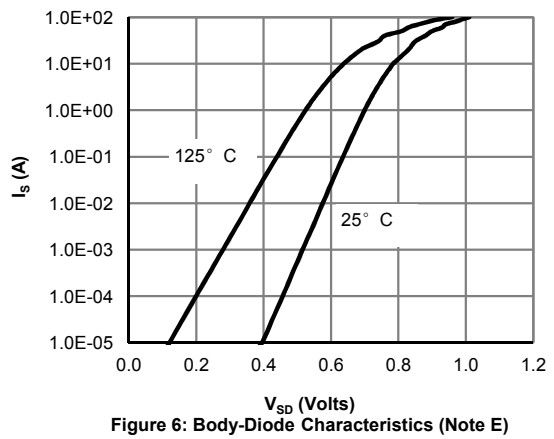


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

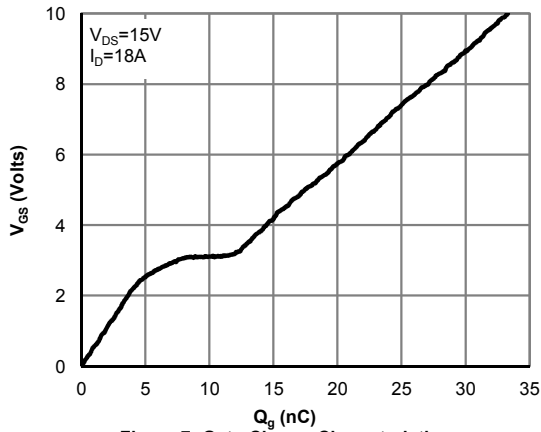


Figure 7: Gate-Charge Characteristics

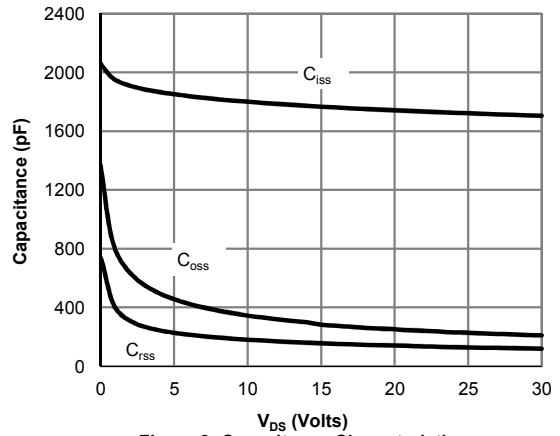


Figure 8: Capacitance Characteristics

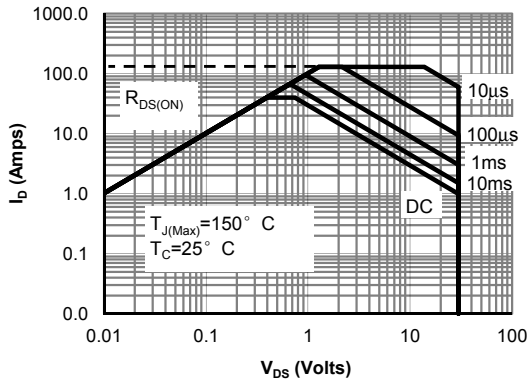


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

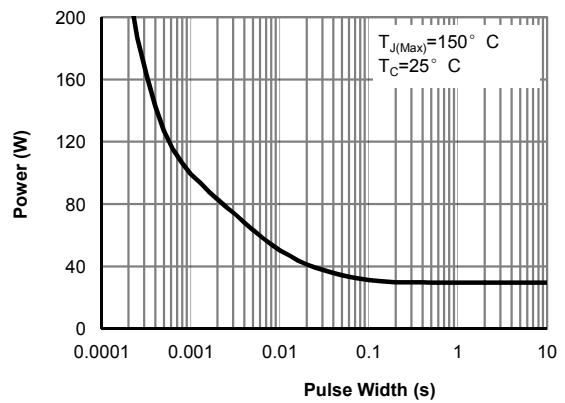


Figure 10: Single Pulse Power Rating Junction-to-Ca (Note F)

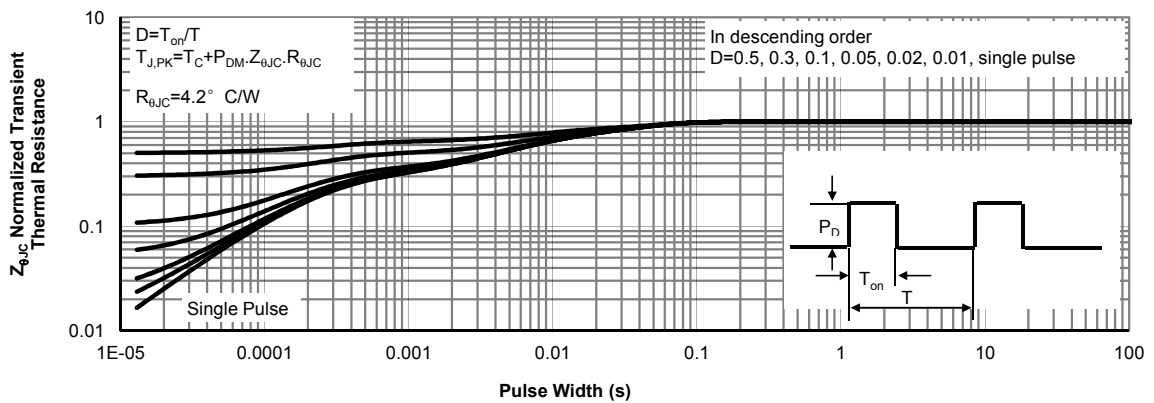


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

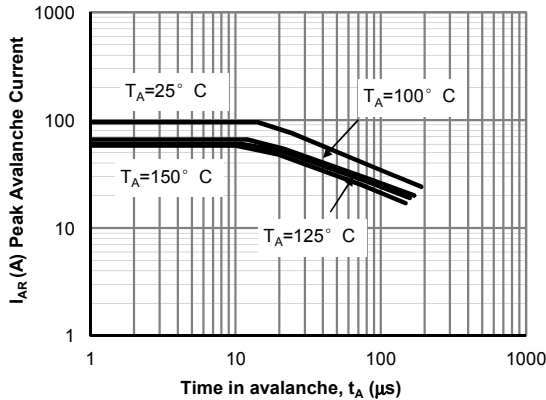


Figure 12: Single Pulse Avalanche capability (Note C)

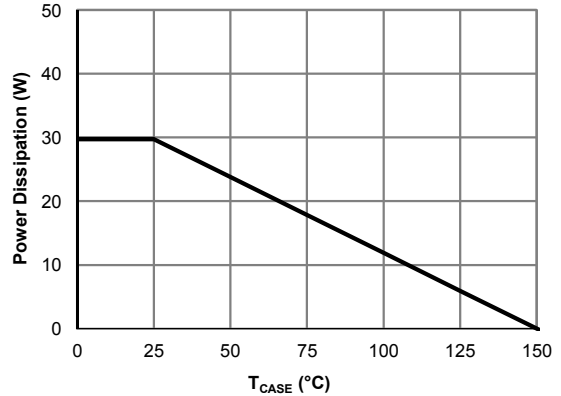


Figure 13: Power De-rating (Note F)

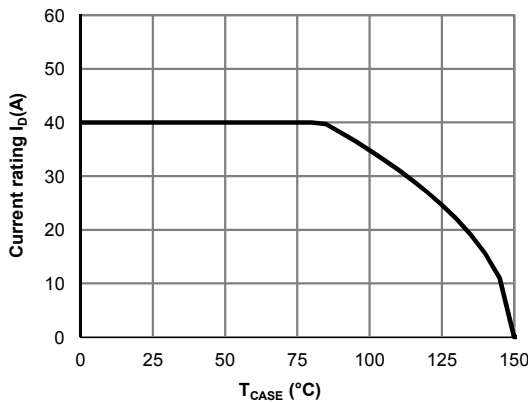


Figure 14: Current De-rating (Note F)

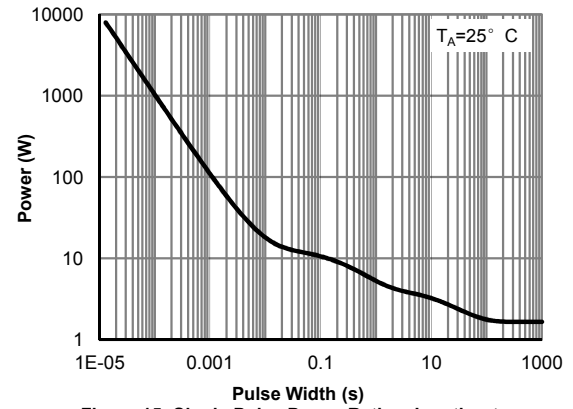


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

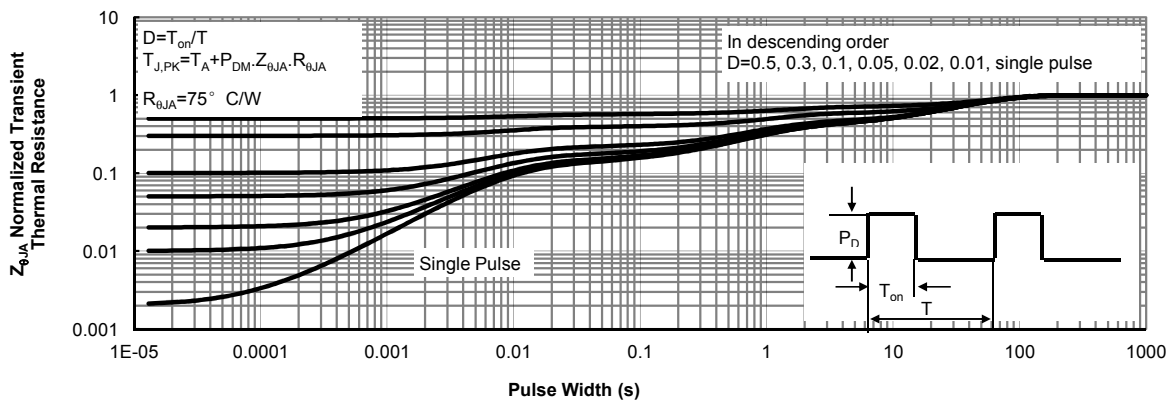
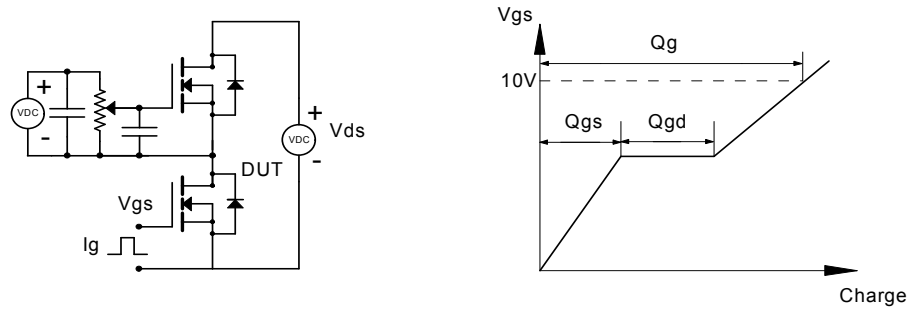
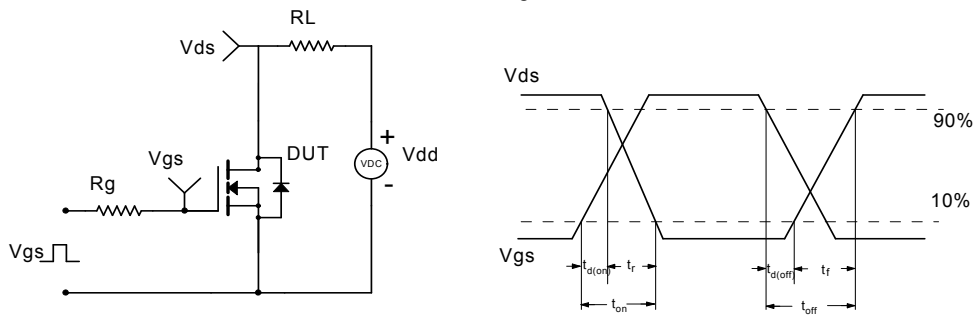


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

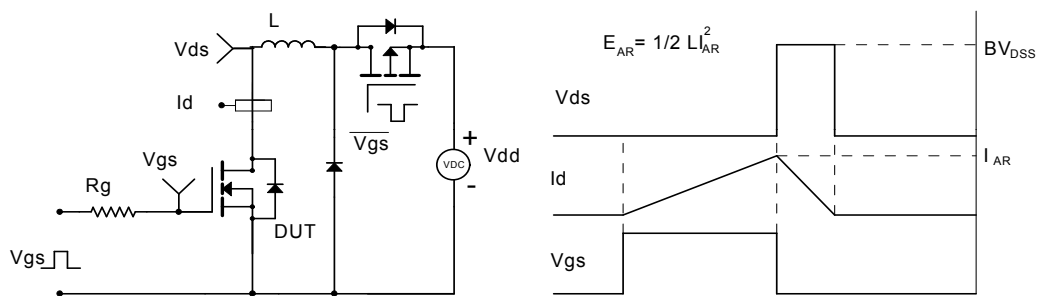
Gate Charge Test Circuit & Waveform



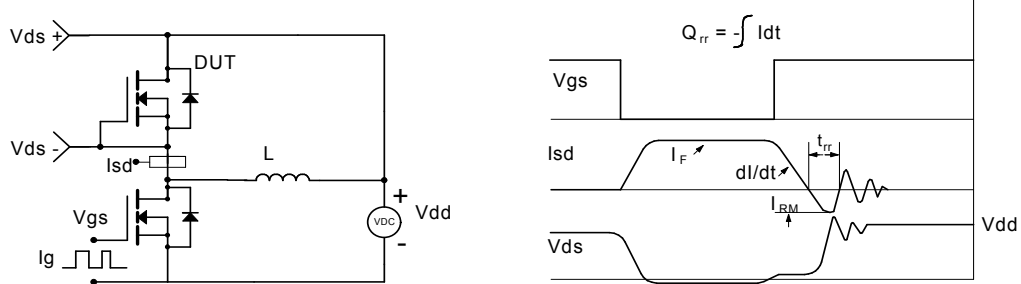
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



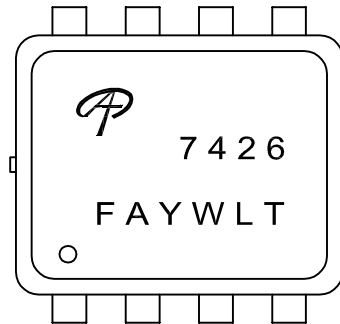
Diode Recovery Test Circuit & Waveforms





Document No.	PD-00969
Version	B
Title	AON7426 Marking Description

DFN3X3 PACKAGE MARKING DESCRIPTION



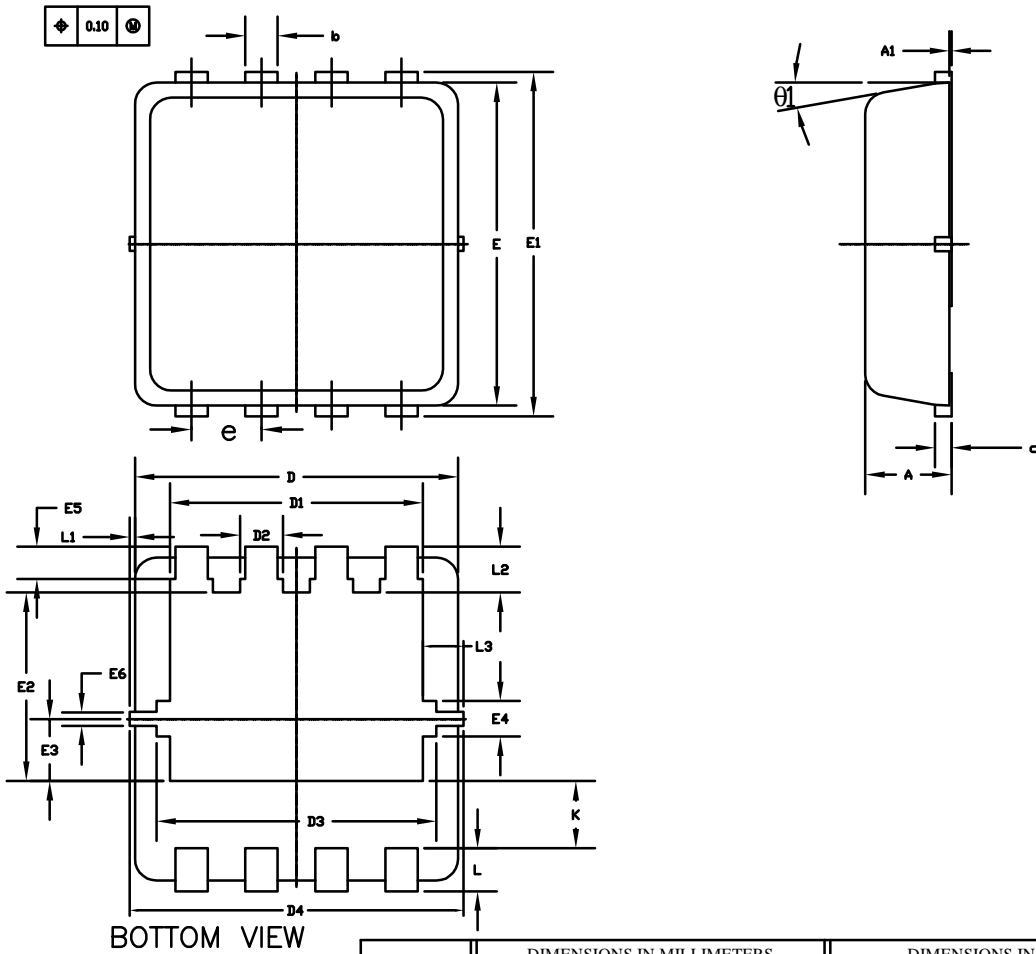
Green product

NOTE:
LOGO - AOS Logo
7426 - 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
AON7426	Green product	7426
AON7426L	Green product	7426

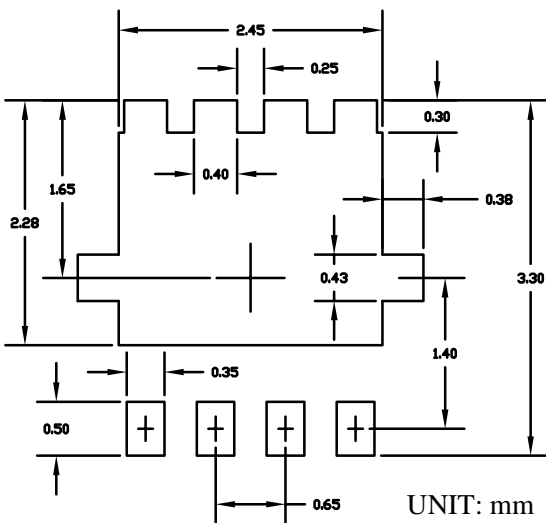


DFN3x3A_8L_EP1_P PACKAGE OUTLINE



BOTTOM VIEW

RECOMMENDED LAND PATTERN



UNIT: mm

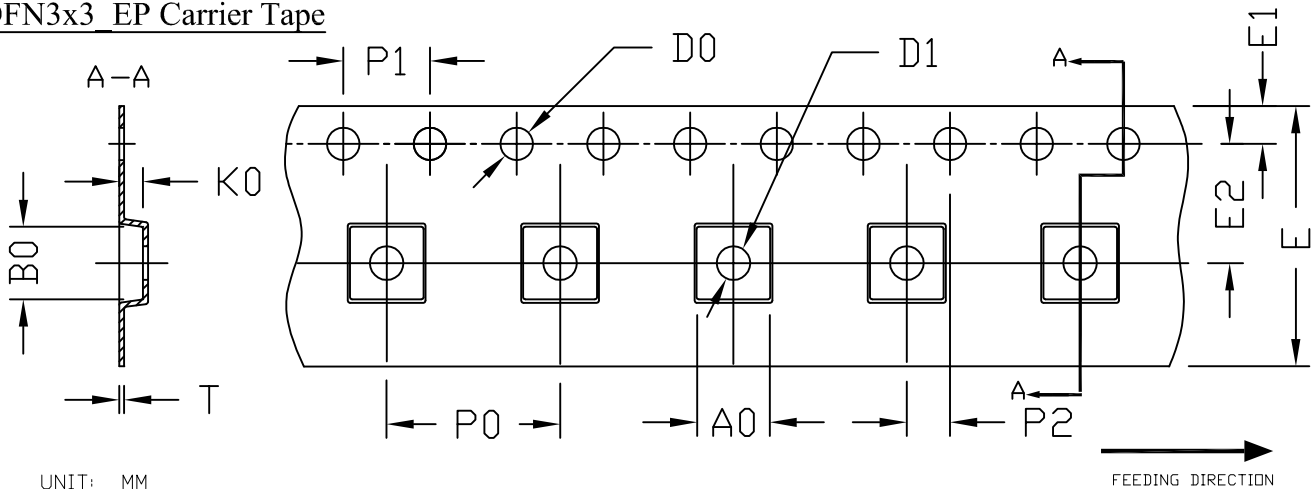
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035
A1	0.00	0.025	0.05	0.000	0.001	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.10	0.15	0.25	0.004	0.006	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
D1	2.25	2.35	2.45	0.089	0.093	0.097
D2	0.30	0.40	0.50	0.012	0.016	0.020
D3	2.50	2.60	2.70	0.098	0.102	0.106
D4	3.00	3.10	3.20	0.118	0.122	0.126
E	2.90	3.00	3.10	0.114	0.118	0.122
E1	3.10	3.20	3.30	0.122	0.126	0.130
E2	1.65	1.75	1.85	0.065	0.069	0.073
E3	0.48	0.58	0.68	0.019	0.023	0.027
E4	0.23	0.33	0.43	0.009	0.013	0.017
E5	0.20	0.30	0.40	0.008	0.012	0.016
E6	0.075	0.125	0.175	0.003	0.005	0.007
e	0.60	0.65	0.70	0.024	0.026	0.028
K	0.52	0.62	0.72	0.020	0.024	0.028
L	0.30	0.40	0.50	0.012	0.016	0.020
L1	0	0.05	0.10	0	0.002	0.004
L2	0.33	0.43	0.53	0.013	0.017	0.021
L3	0.275	0.375	0.475	0.011	0.015	0.019
theta1	0°	10°	12°	0°	10°	12°

NOTE

1. PACKAGE DIMENSION IS EXCLUSIVE OF MOLD GATE BURR
2. PACKAGE DIMENSION IS EXCLUSIVE OF MOLD FLASH AND CUTTING BURR
3. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.



DFN3x3 EP Carrier Tape

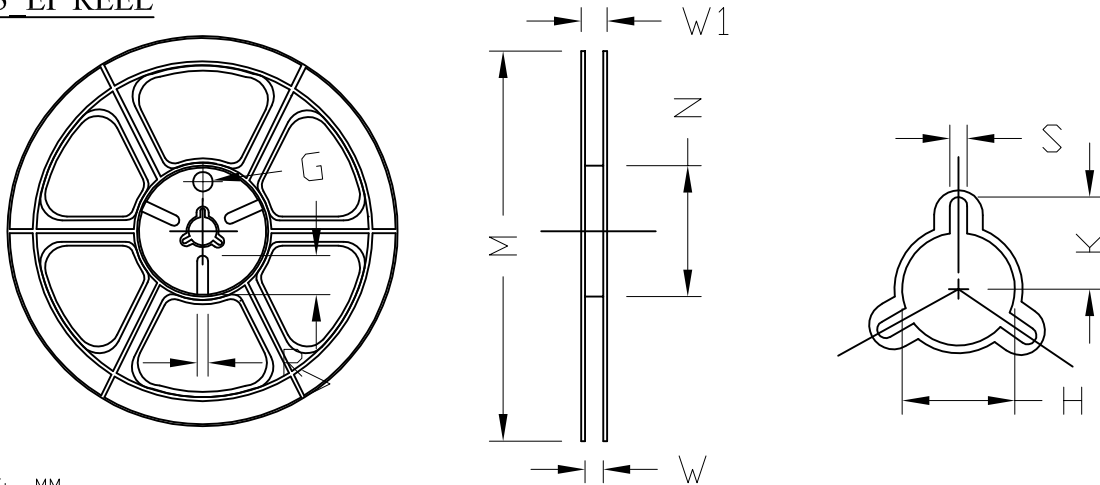


UNIT: MM

FEEDING DIRECTION

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DFN3x3_EP	3.40 ±0.10	3.35 ±0.10	1.10 ±0.10	1.50 +0.10 -0	1.50 +0.10 -0	12.00 ±0.30	1.75 ±0.10	5.50 ±0.05	8.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.30 ±0.05

DFN3x3 EP REEL



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
12 mm	∅330	∅330.00 ±0.50	∅97.00 ±0.10	13.00 ±0.30	17.40 ±1.00	∅13.00 +0.50 -0.20	10.60	2.00 ±0.50	---	---	---

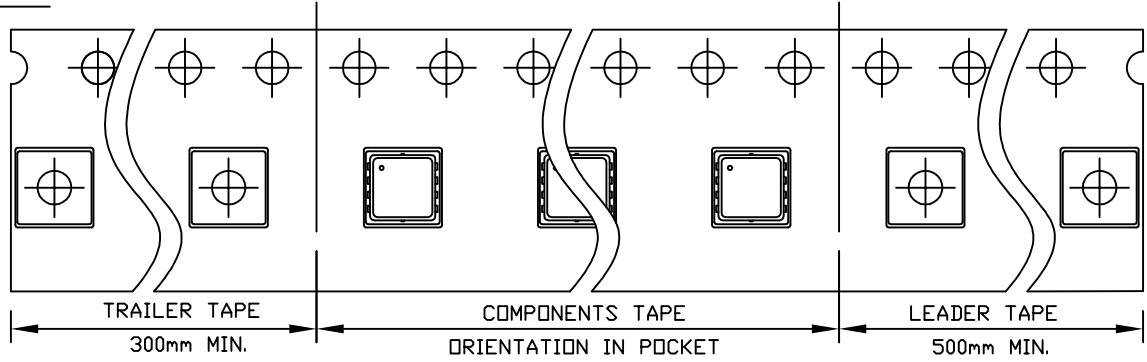


DFN3x3 EP TAPE

Leader / Trailer
& Orientation

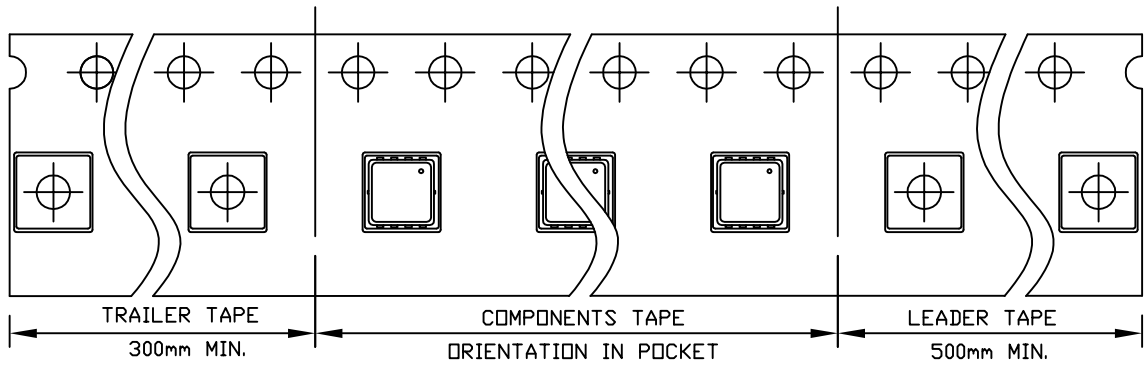
MOS

Unit Per Reel:
5000pcs



PIC

Unit Per Reel:
5000pcs





AOS Semiconductor Product Reliability Report

AON7426, rev D

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

This AOS product reliability report summarizes the qualification result for AON7426. 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 AON7426 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.

Table of Contents:

- I. Product Description
- II. Package and Die information
- III. Reliability Stress Test Summary and Results
- IV. Reliability Evaluation

I. Product Description:

The AON7426 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Details refer to the datasheet.

II. Die / Package Information:

Process	AON7426 Standard sub-micron 30V N-Channel MOSFET
Package Type	DFN3x3 EP
Lead Frame	Bare Cu
Die Attach	Ag Epoxy
Bond	Cu wire
Mold Material	Epoxy resin with silica filler
Moisture Level	Up to Level 1

III. 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	924 pcs	0	JESD22-A108
HTRB	Temp = 150°C , Vds=80% of Vdsmax	168 / 500 / 1000 hours	924 pcs	0	JESD22-A108
MSL Precondition	168hr 85°C / 85%RH + 3 cycle reflow@260°C (MSL 1)	-	5082 pcs	0	JESD22-A113
HAST	130°C , 85%RH, 33.3 psi, Vds = 80% of Vdsmax	96 hours	924 pcs	0	JESD22-A110
H3TRB	85°C , 85%RH, Vds = 80% of Vdsmax	1000 hours	924 pcs	0	JESD22-A101
Autoclave	121°C , 29.7psi, RH=100%	96 hours	924 pcs	0	JESD22-A102
Temperature Cycle	-65°C to 150°C , air to air,	250 / 500 cycles	924 pcs	0	JESD22-A104
HTSL	Temp = 150°C	1000 hrs	693 pcs	0	JESD22-A103
Power Cycling	Δ Tj = 100°C	15000 cycles	693 pcs	0	AEC Q101

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

IV. Reliability Evaluation

FIT rate (per billion): 3.43

MTTF = 33270 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 = $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 3.43$

MTTF = $10^9 / \text{FIT} = 33270$ 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, $8.617164 \times 10^{-5} \text{eV} / \text{K}$