ALPHA & OMEGA SEMICONDUCTOR, LTD

AON3806

Common-Drain Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

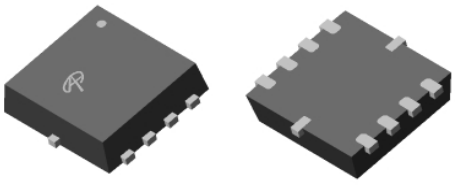
The AON3806 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V while retaining a 12V $V_{GS(MAX)}$ rating. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration. *Standard Product AON3806is Pb-free (meets ROHS & Sony 259 specifications).*

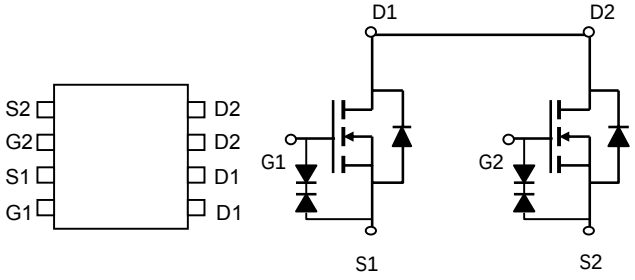
Features

V_{DS} (V) = 20V
I_D =6.8 A (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 26mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 27mΩ (V_{GS} = 4V)
$R_{DS(ON)}$ < 35mΩ (V_{GS} = 2.5V)
ESD Protected

DFN 3x3

Top View **Bottom View**





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I_D	6.8	A
	T_A=70°C		5.4	
Pulsed Drain Current [B]		I_{DM}	40	
Power Dissipation [A]	T_A=25°C	P_D	1.9	W
	T_A=70°C		1.2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	55	65	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		78	95	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	30	50	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V			1	µA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±10V			10	µA
BV_{GSO}	Gate-Source Breakdown Voltage	V_{DS}=0V, I_G=±250uA	±12			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.5	0.7	1	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=6.8A		21	26	mΩ
		T_J=125°C		29	35	
		V_{GS}=4V, I_D=6A		22	27	mΩ
		V_{GS}=2.5V, I_D=5A		28	35	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=6.8A		25		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.75	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz		615		pF
C_{oss}	Output Capacitance			150		pF
C_{rss}	Reverse Transfer Capacitance			120		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.9		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=6.8A		8.5		nC
Q_{gs}	Gate Source Charge			1.2		nC
Q_{gd}	Gate Drain Charge			3		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=5V, V_{DS}=10V, R_L=1.4Ω, R_{GEN}=3Ω		7		ns
t_r	Turn-On Rise Time			13		ns
$t_{D(off)}$	Turn-Off DelayTime			29		ns
t_f	Turn-Off Fall Time			11		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=6.8A, dI/dt=100A/µs		15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=6.8A, dI/dt=100A/µs		5		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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. The current rating is based on the t≤ 10s thermal resistance rating.

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

C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

Rev 3: October 2006

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

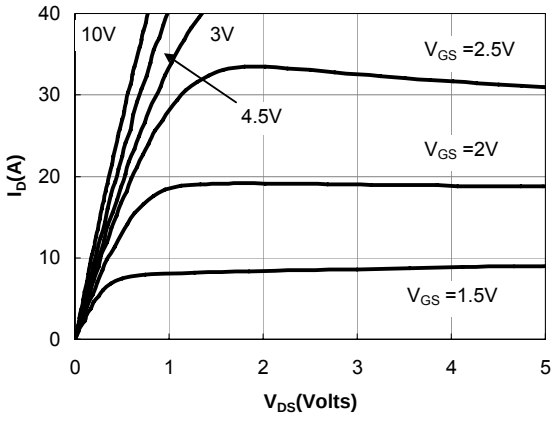


Figure 1: On-Regions Characteristics

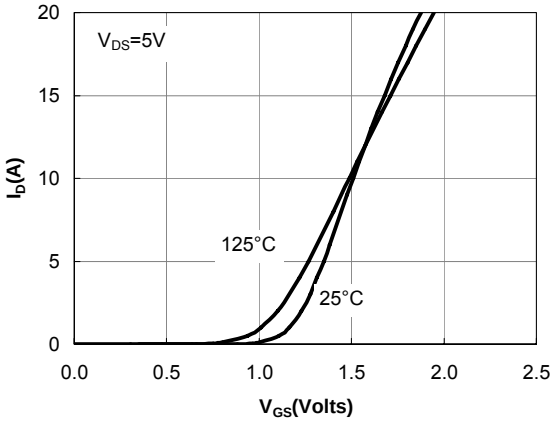


Figure 2: Transfer Characteristics

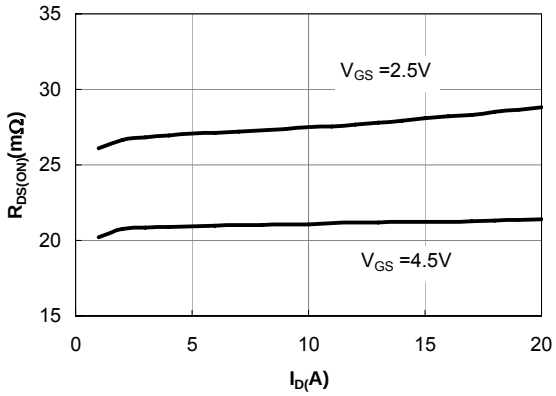


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

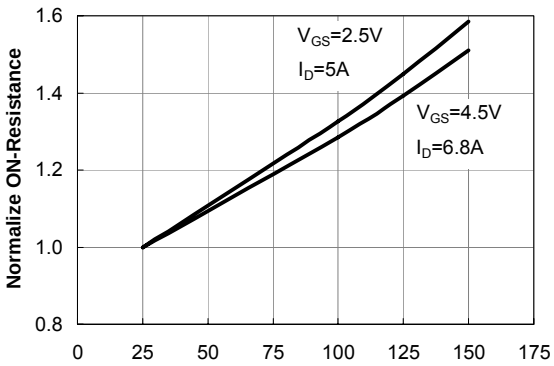


Figure 4: On-Resistance vs. Junction Temperature

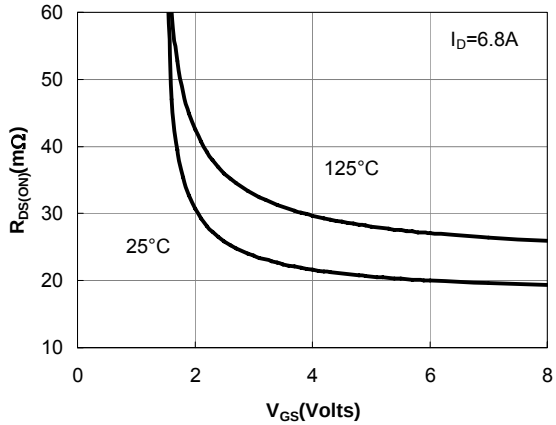


Figure 5: On-Resistance vs. Gate-Source Voltage

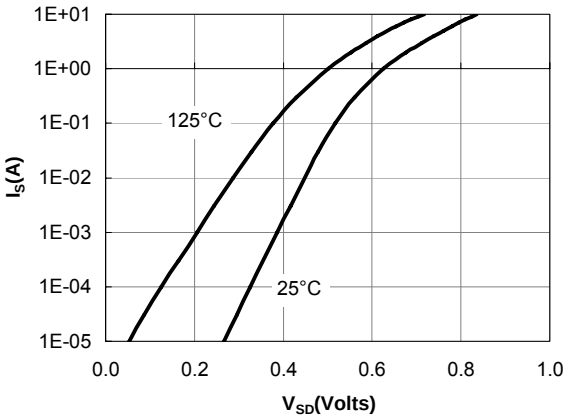


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

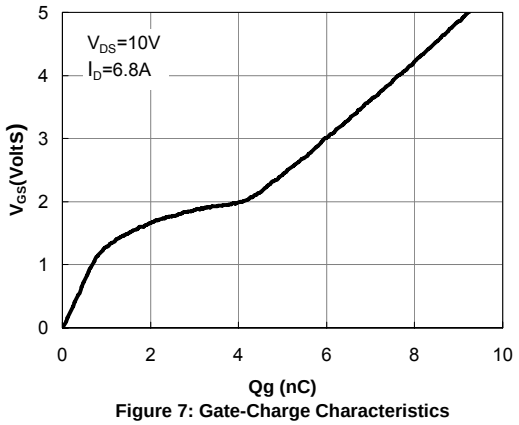


Figure 7: Gate-Charge Characteristics

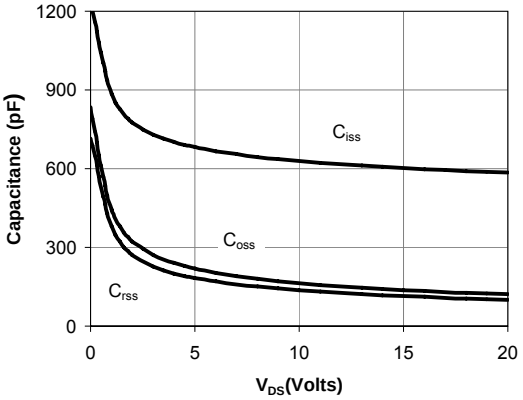


Figure 8: Capacitance Characteristics

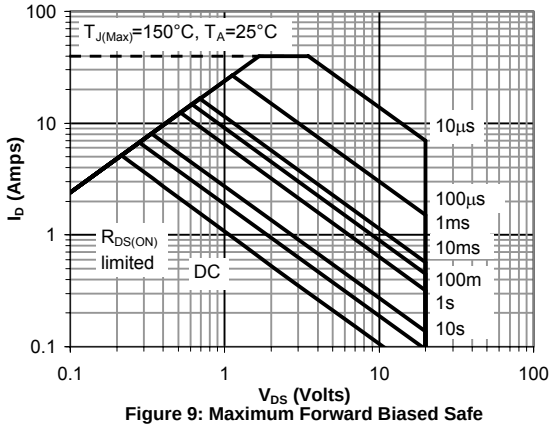


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

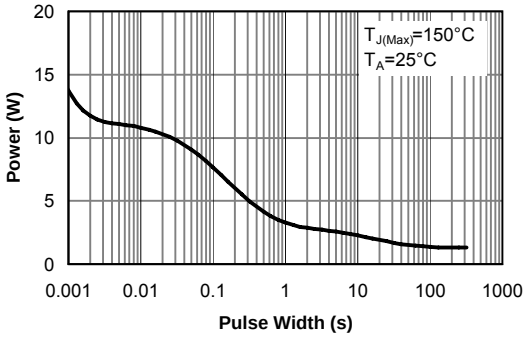


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

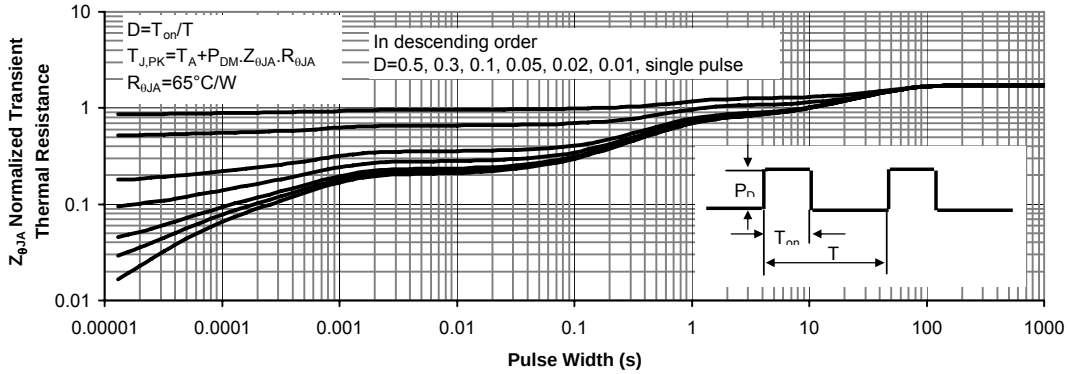
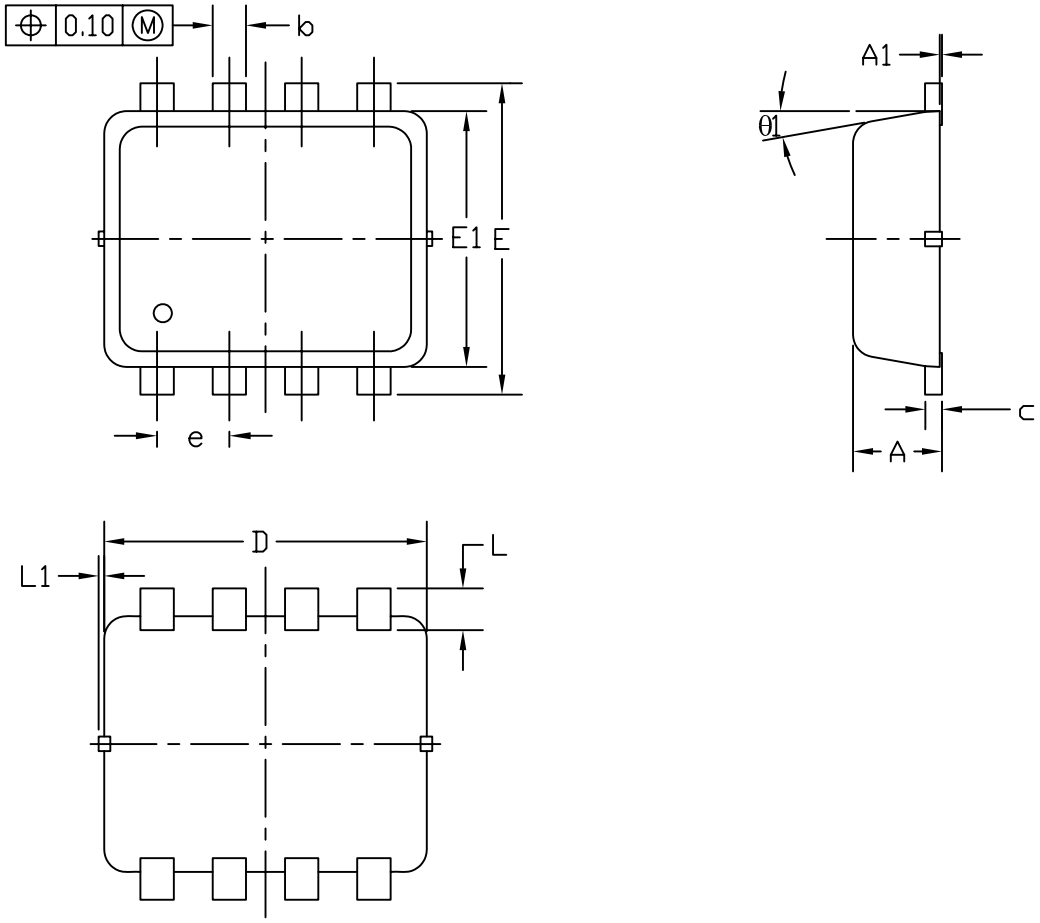


Figure 11: Normalized Maximum Transient Thermal Impedance

ALPHA & OMEGA SEMICONDUCTOR

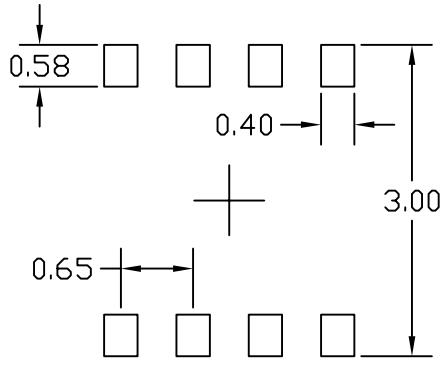
Document No.	P0-00034
Version	rev A

DFN 3x3-A 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	---	0.05	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.08	0.15	0.25	0.003	0.006	0.010
D	2.90 BSC			0.114 BSC		
E	2.80 BSC			0.110 BSC		
E1	2.30 BSC			0.091 BSC		
e	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.45	0.008	0.015	0.018
L1	0	---	0.10	0	---	0.004
θ1	0°	10°	12°	0°	10°	12°

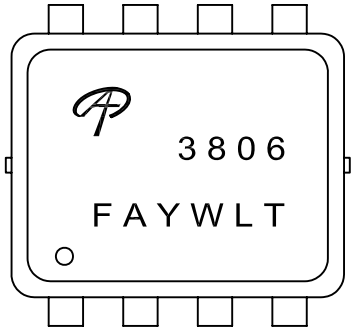
NOTE

1. PAKCAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
   MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS.
2. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

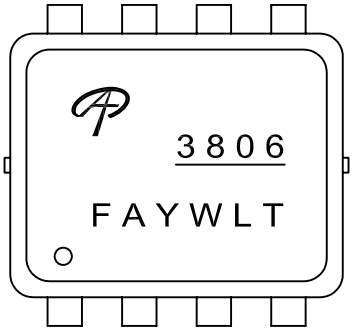
ALPHA & OMEGA SEMICONDUCTOR

Document No.	PD-00496
Version	A
Title	AON3806 Marking Description

DFN3X3 PACKAGE MARKING DESCRIPTION



Standard product



Green product

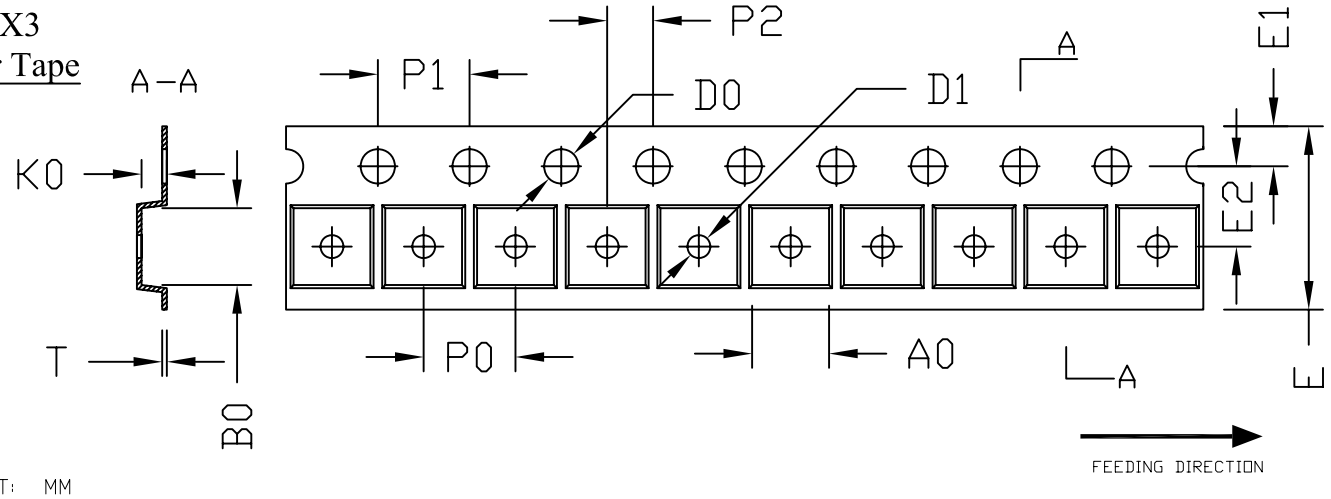
NOTE:
LOGO - AOS Logo
3806 - Part number code
F - Fab code
A - Assembly location code
Y - Year code
W - Week code
L&T - Assembly lot code

PART NO.	DESCRIPTION	CODE
AON3806	Standard product	3806
AON3806L	Green product	3806

ALPHA & OMEGA
SEMICONDUCTOR, LTD.

DFN 3X3 Tape and Reel Data

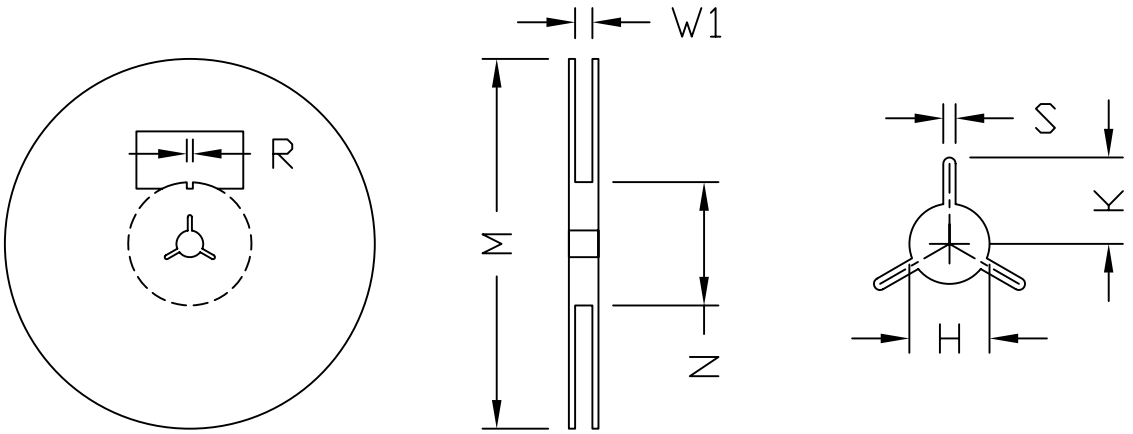
DFN 3X3 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DFN 3X3	3.35 ±0.10	3.35 ±0.10	1.25 ±0.10	1.50 +0.1 −0	1.00 +0.25 −0	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	0.200 ±0.02

DFN 3X3 REEL



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W1	H	S	K	R
8	ø180	ø180.0 ±0.50	60.0 ±0.50	8.4 +1.5 −0	13.0 ±0.20	1.5 MIN.	13.5 MIN.	3.0 ±0.50

DFN 3X3 TAPE

Leader / Trailer & Orientation