AONV070V65G1

650V Enhancement Mode GaN Transistor

Features

- 650V Enhancement Mode GaN Transistor
- Normal-off Design
- Ultra-low Qg
- No Qrr
- Low Inductance

Applications

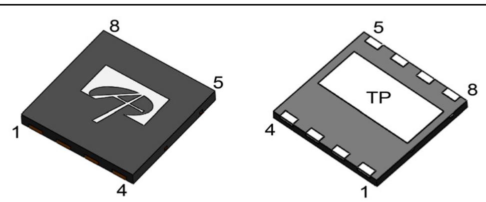
- Server Power Supplies
- High-Frequency Converters
- Resonant Topologies

Product Summary

V_{DS} @ T_J, max	650V
I_{DM}	45A
$R_{DS(ON)}$	70mΩ
Q_g, typ	6.9nC
E_{oss} @ 400V	6µJ

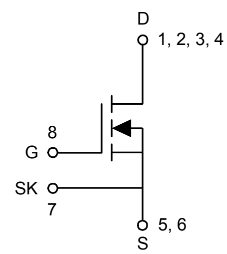
Pin Configuration and Pin Names

DFN 8x8



Top View **Bottom View**

Pin Names	
Gate	8
Drain	1, 2, 3, 4
Kelvin Source	7
Source	5, 6
Thermal Pad (Connected to Source)	TP



Absolute Maximum Ratings

Exceeding the Absolute Maximum Ratings may damage the device. T_A = 25°C, unless otherwise stated.

Symbol	Parameter		Maximum	Units
V_{DS}	Drain-Source Voltage		650 (DC) 720 (AC)	V
V_{GS}	Gate-Source Voltage		+6 / -4 (DC) +10 / -10 (AC)	V
I_D	Continuous Drain Current	T_A = 25°C T_A = 100°C	16(1) 12(1)	A
P_D	Power Dissipation(2)	Derate above 25°C	125	W
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to 150	°C
T_L	Maximum Lead and Temperature for Soldering		260	°C

Thermal Characteristics

Symbol	Parameter	Maximum	Units
$R_{JC\theta}$	Maximum Junction-to-Case	1	°C/W
$R_{JA\theta}$	Maximum Junction-to-Ambient(3)	65	°C/W

Electrical Characteristics

T_A = 25 °C, V_{IN} = V, unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC							
$V_{DS(max)}$	Drain-Source Voltage	DC static V_{DS}(max)				650	V
		AC transient V_{DS}(max)				720	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V			0.5		μA
			T_J=150°C		5		
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=6V			100		μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=5V, I_D=5mA		1.1	1.8	2.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=6V, I_D=6A			70	90	mΩ
			T_J = 150°C		165		
V_{SD}	Diode Forward Voltage	I_S=10A,V_{GS}=0V			2.3		V
DYNAMIC							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=400V, f=1MHz			203		pF
C_{oss}	Output Capacitance				58		pF
$C_{o(er)}$	Effective Output Capacitance, Energy Related[4]	V_{GS}=0V, V_{DS}=0 to 400V, f=1MHz			74		pF
$C_{o(tr)}$	Effective Output Capacitance, Time Related[5]				105		pF
C_{rss}	Reverse Transfer Capacitance	V_{GS}=0V, V_{DS}=400V, f=1MHz			1.5		pF
R_g	Gate Resistance	f=1MHz			10		Ω
SWITCHING							
Q_g	Total Gate Charge	V_{GS}=6V, V_{DS}=400V, I_D=6A			6.9		nC
Q_{gs}	Gate Source Charge				2		nC
Q_{gd}	Gate Drain Charge				1.4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-3V/+6V, V_{DS}=400V, I_D=6A, $R_{G,ON}$=4.7Ω, $R_{G,OFF}$=1Ω			2.4		ns
t_r	Turn-On Rise Time				5.4		ns
$t_{D(off)}$	Turn-Off DelayTime				6.2		ns
t_f	Turn-Off Fall Time				14.2		ns
Q_{rr}	Body Diode Reverse Recovery Charge	IF=6A, dI/dt=100A/ms, V_{DS}=400V			0		nC
Q_{oss}	Output Charge	IF=6A, dI/dt=100A/ms, V_{DS}=400V			42		nC

Notes:

1. 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.
2. 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.
3. The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25°C.
4. $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.
5. $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$
6. 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.
7. The static characteristics in Figures 1 to 7 are obtained using <300ms pulses, duty cycle 0.5% max.

Typical Characteristics

T_A = 25 °C, V_{IN} = V, unless otherwise specified

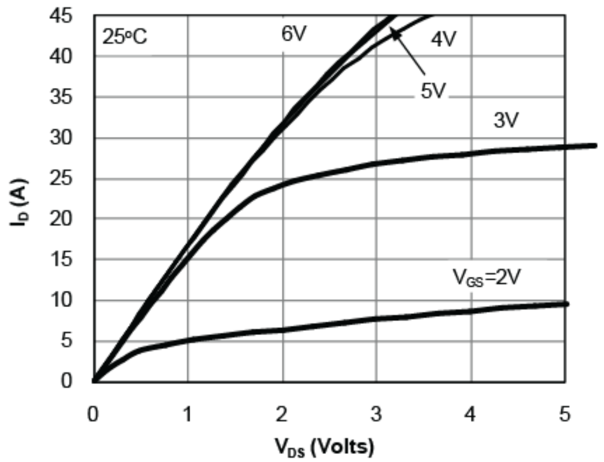


Figure 1. On-Region Characteristics

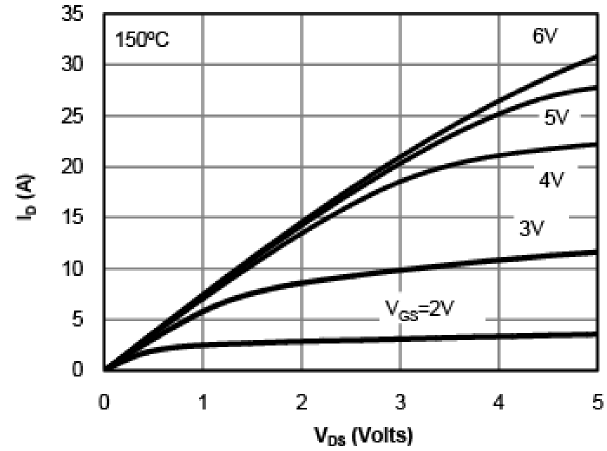


Figure 2. High Temperature On-Region

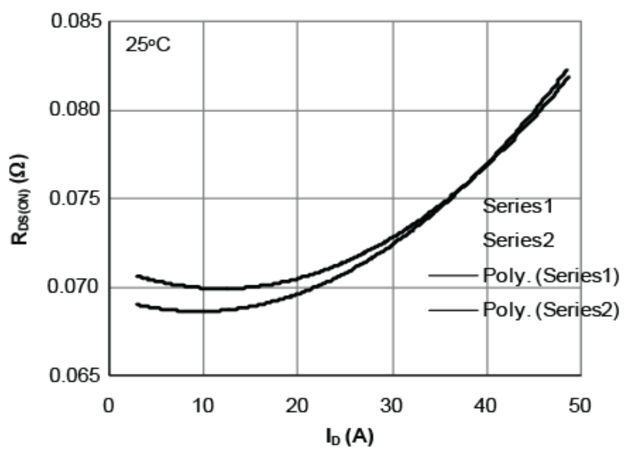


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

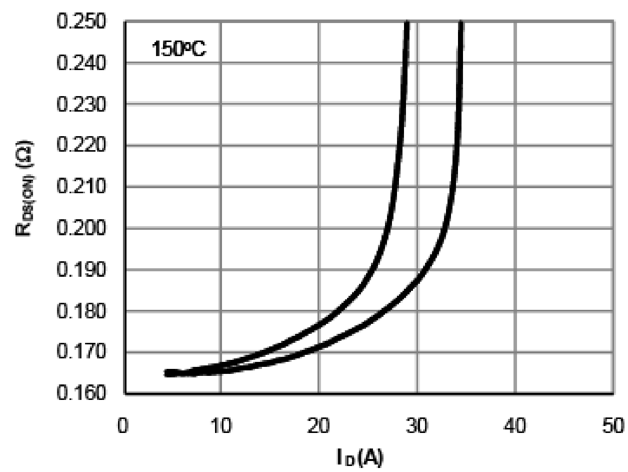


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

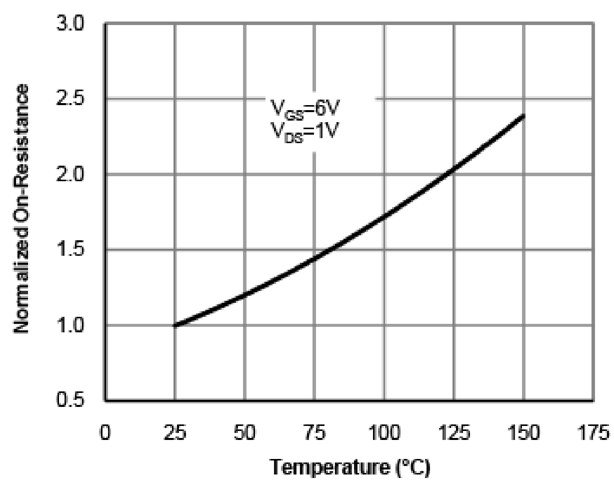


Figure 5. On-Resistance vs. Junction Temperature

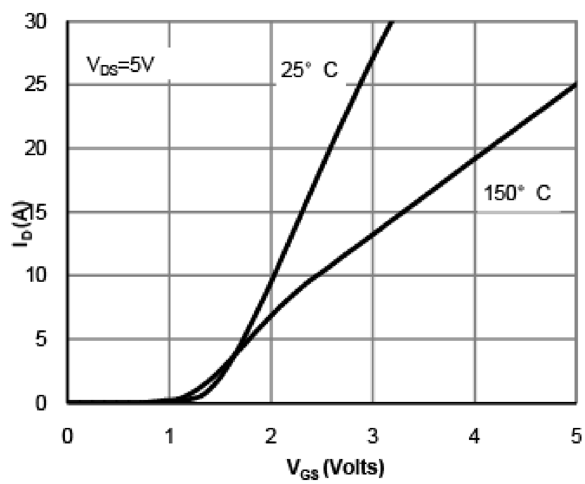


Figure 6. Transfer Characteristics

Typical Characteristics

T_A = 25 °C, V_{IN} = V, unless otherwise specified

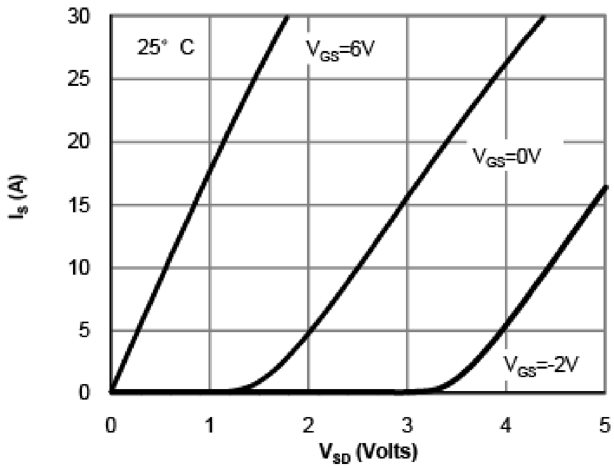


Figure 7. Body-Diode Characteristics

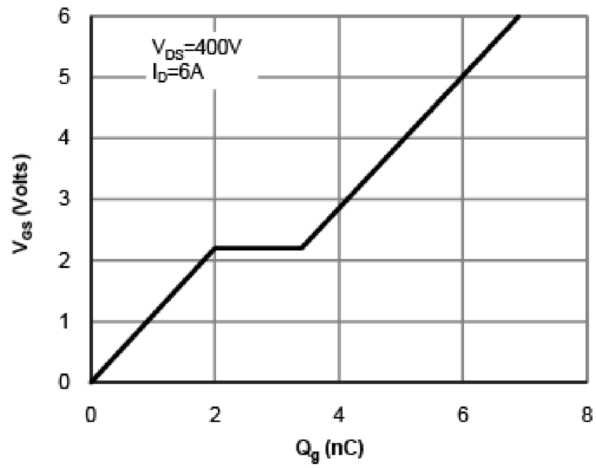


Figure 8. Gate-Charge Characteristics

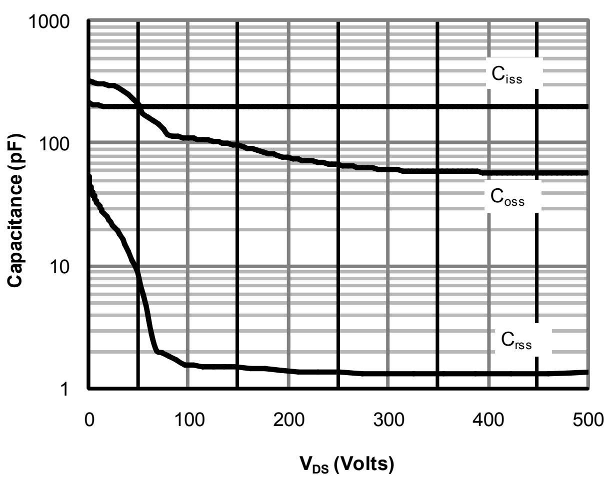


Figure 9. Capacitance Characteristics

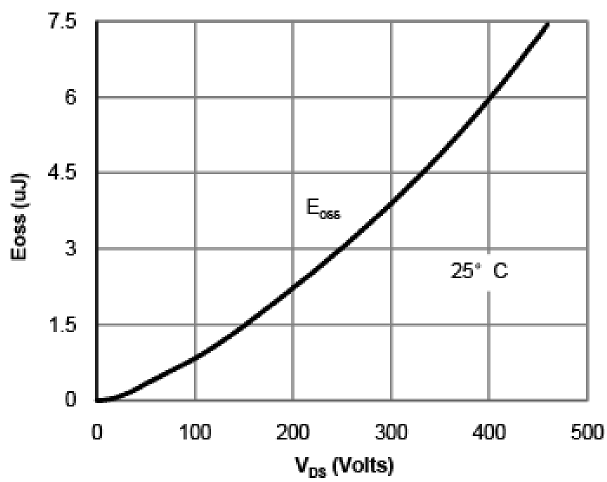


Figure 10. Coss Stored Energy

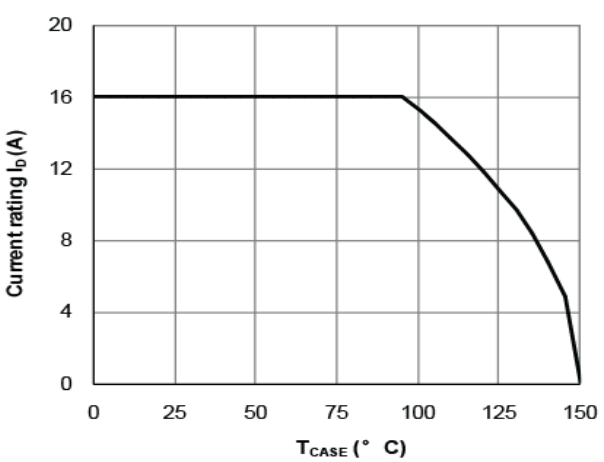


Figure 11. Current De-rating (Note 6)

Typical Characteristics

T_A = 25 °C, V_{IN} = V, unless otherwise specified

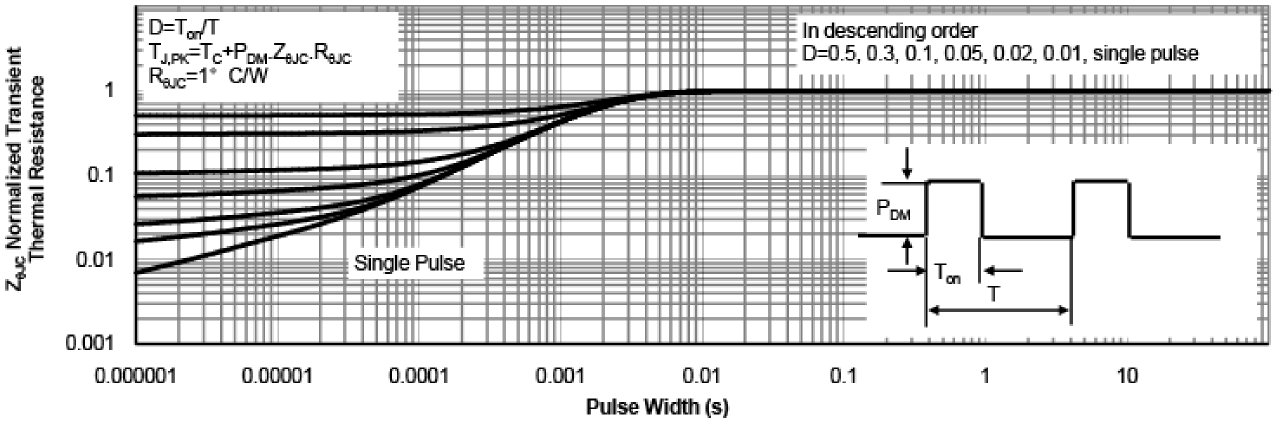
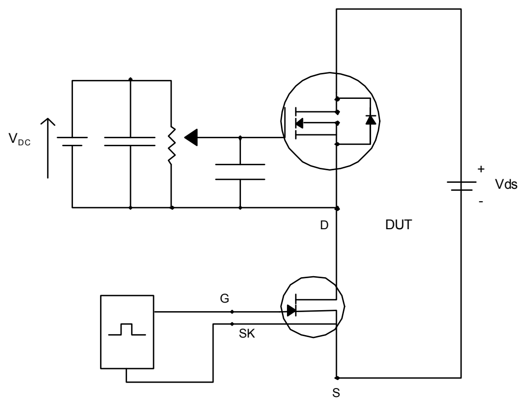
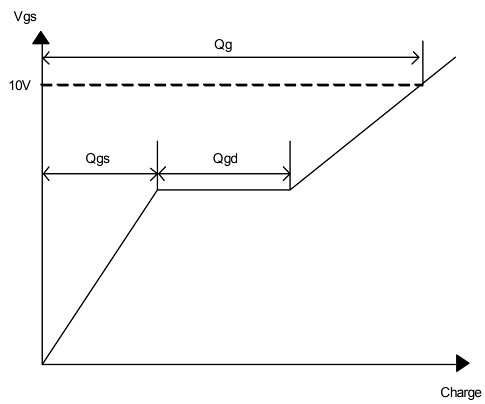


Figure 12. Normalized Maximum Transient Thermal Impedance for TO-220F Pb Free (Note 6)

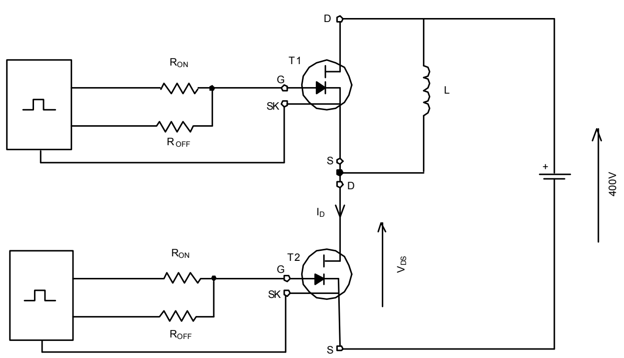
Test Circuits and Waveforms

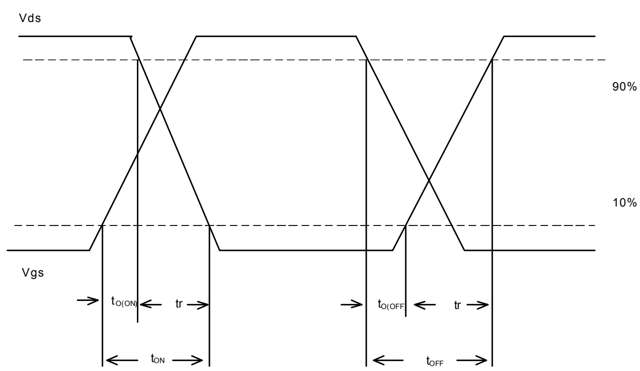
Gate Charge Test Circuit & Waveforms



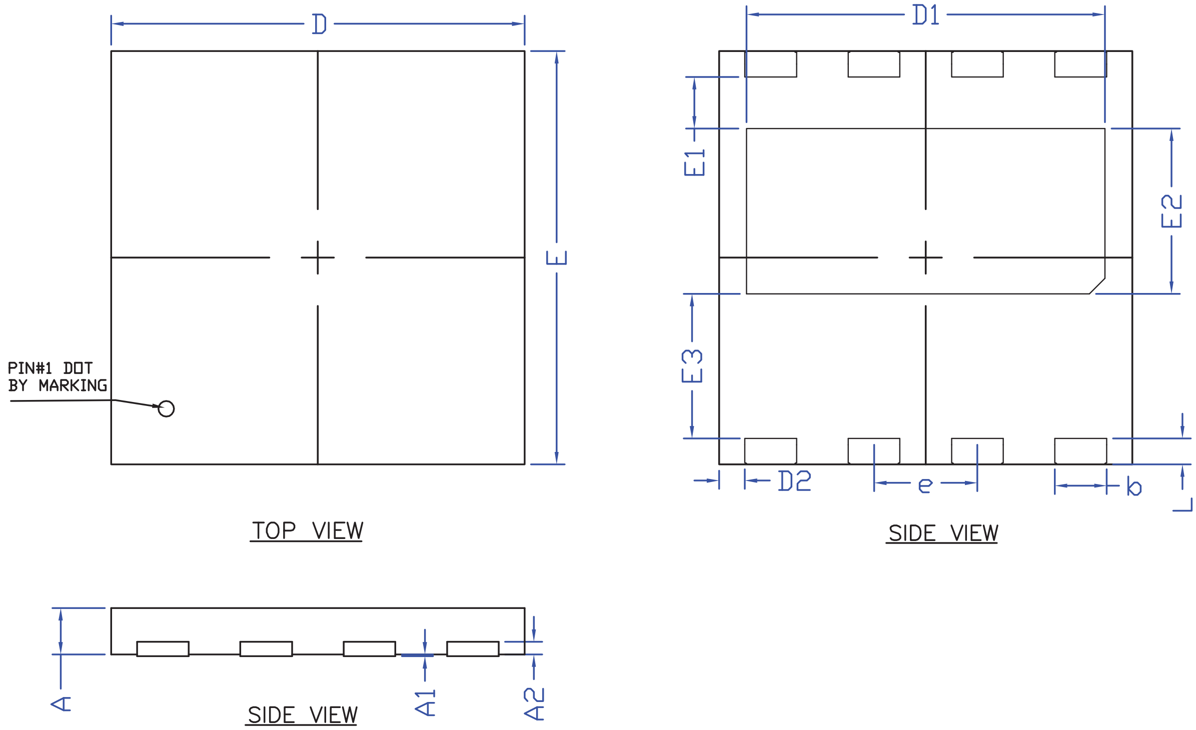


Resistive Switching Test Circuit & Waveforms

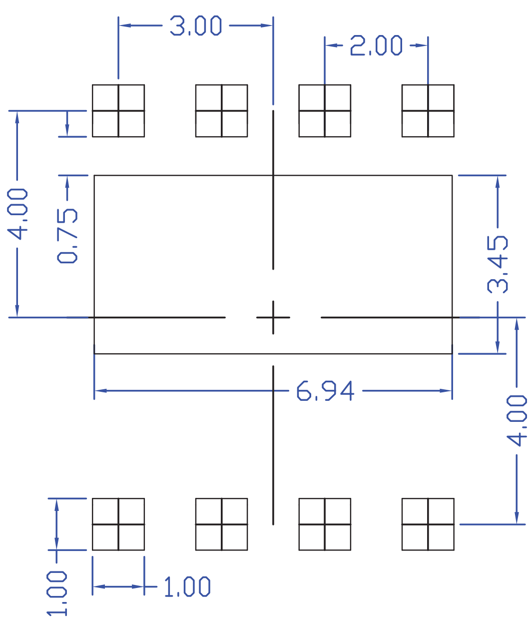




Package Dimensions, DFN8x8-8L



RECOMMENDED LAND PATTERN



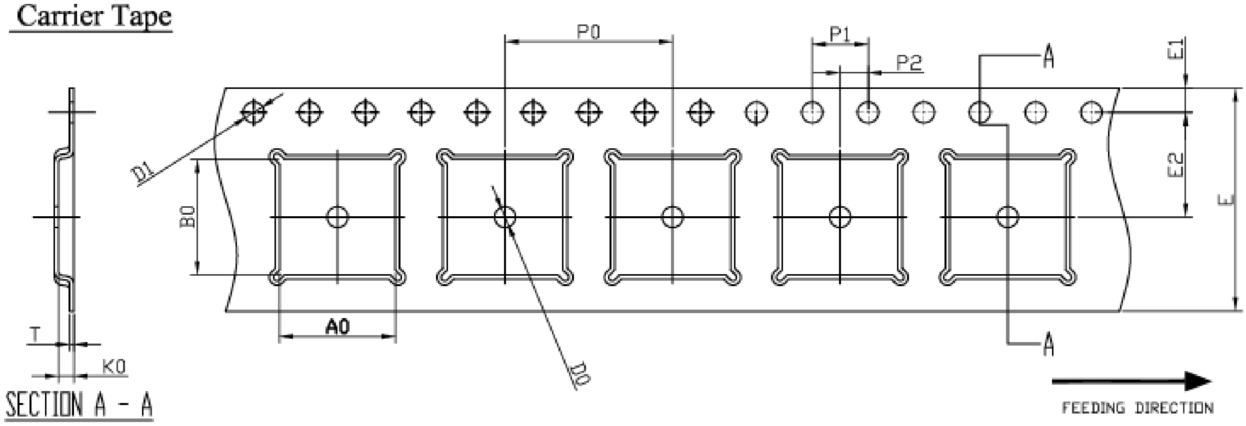
UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	MON	MAX
A	0.800		1.100	0.031		0.043
A1	0.000		0.050	0.000		0.002
A2	0.150	0.250	0.350	0.006	0.010	0.014
b	0.900	1.000	1.100	0.035	0.039	0.043
D	7.900	8.000	8.100	0.311	0.315	0.319
D1	6.840	6.940	7.040	0.269	0.273	0.277
D2	0.400	0.500	0.600	0.016	0.020	0.024
E	7.900	8.000	8.100	0.311	0.315	0.319
E1	0.900	1.000	1.100	0.035	0.039	0.043
E2	3.100	3.200	3.300	0.122	0.126	0.130
E3	2.700	2.800	2.900	0.106	0.110	0.114
e	2.00 B.S.C.			0.079 B.S.C.		
L	0.400	0.500	0.600	0.016	0.020	0.024

NOTE
CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

Tape and Reel, DFN8x8-8L

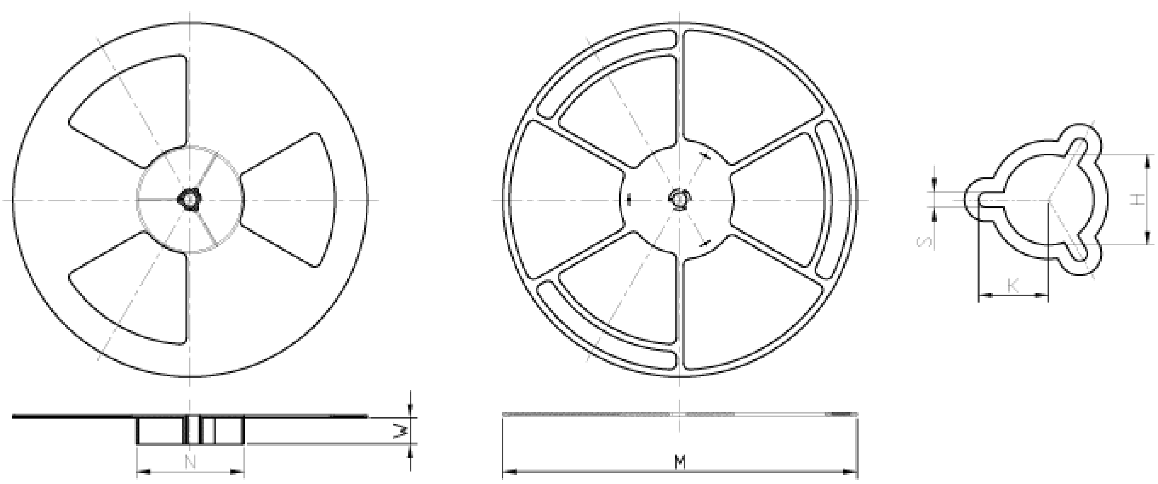
Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DFN8x8 (16 mm)	8.30 ±0.10	8.30 ±0.10	1.10 ±0.10	1.50 MIN.	1.50 $^{+0.10}_{0.00}$	16.00 ±0.30	1.75 ±0.10	7.50 ±0.10	12.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.30 ±0.10

Reel

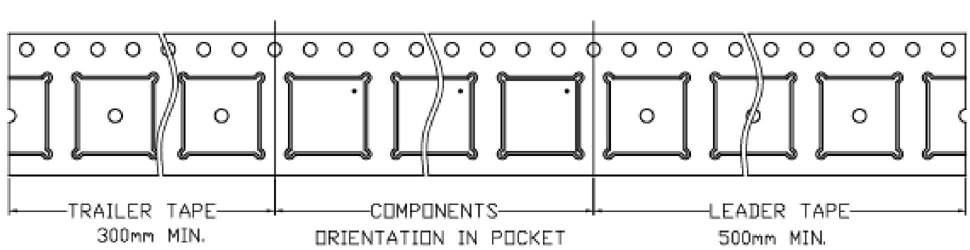


UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	H	K	S
16 mm	ø330	ø330.00 MAX.	ø100.00 MIN.	16.4 +2.0 −0.0	ø13.0 +0.5 −0.2	10.1 MIN.	1.5 MIN.

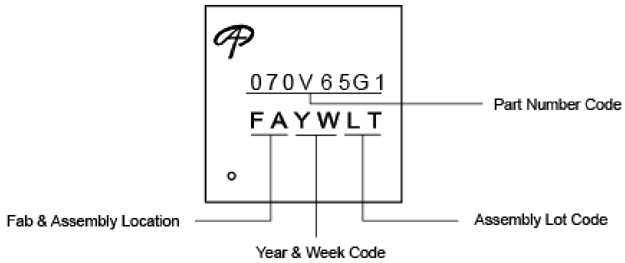
Tape

Leader / Trailer & Orientation



Part Marking

AONV070V65G1
(DFN8x8)



PART NO.	DESCRIPTION	CODE
AONV070V65G1	Green product	070V65G1

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.