ALPHA & OMEGA SEMICONDUCTOR

AOTL035V65GA1

650V GaN Enhancement-mode Power Transistor

Features

- 650V GaN enhancement-mode transistor
- Normally off design
- No Qrr (reverse recovery charge)
- Low Qg (gate charge), low Qoss (output charge)
- Integrated ESD protection

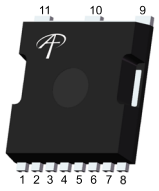
Applications

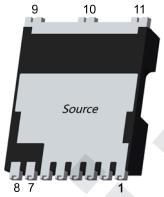
- AC/DC and DC/DC converters, totem pole PFC, fast battery charging, high density and high efficiency power conversion

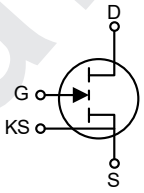
Product Summary at T_J = 25°C

$V_{DS, max}$	650V
$R_{DS(on), max}$ @ V_{GS} = 6V	35mΩ
$Q_{g, typ}$ @ V_{DS} = 400V	14nC
$I_{D, pulse}$	127A
Q_{oss} @ V_{DS} = 400V	132nC
Q_{rr} @ V_{DS} = 400V	0nC

Pin Configuration







Pin Information

Gate	Drain	Kelvin Source	Source
8	9, 10, 11	7	1, 2, 3, 4, 5, 6

Ordering Information

Ordering Part Number	Package Type	Form	Shipping Quantity
AOTL035V65GA1	TOLL	Tape and Reel	1500

Contact local sales office for full product datasheet.

Absolute Maximum Ratings

(T_J = 25°C, unless otherwise noted)

Symbol	Parameter		AOTL035V65GA1	Units
$V_{DS, max}$	Drain Source Voltage	V_{GS} = 0V, T_J = -55°C to 150°C	650	V
$V_{DS, trans}$	Drain Source Voltage Transient (1)	V_{GS} = 0V	800	
$V_{DS, pulse}$	Drain Source Voltage Pulsed (2)	T_C = 25°C, total time < 10 hours	750	
		T_C = 125°C, total time < 1 hour		
I_D	Continuous Drain Current	T_C = 25°C	64	A
		T_C = 125°C	32	
$I_{D, pulse}$	Pulsed Drain Current (3)	T_C = 25°C, V_{GS} = 6V, t_{pulse} = 10µs	127	
		T_C = 125°C, V_{GS} = 6V, t_{pulse} = 10µs	64	
V_{GS}	Gate Source Voltage, Continuous (4)	T_J = -55°C to 150°C	-6 to 7	V

Absolute Maximum Ratings *(Continued)*

(T_J = 25°C, unless otherwise noted)

Symbol	Parameter		AOTL035V65GA1	Units
$V_{GS,\ pulse}$	Gate Source Voltage, Pulsed	T_J = -55°C to 150°C, t_{pulse} = 50ns, f = 100kHz, open drain	-20 to 10	V
P_{tot}	Power Dissipation [5]	T_C = 25°C	367	W
$T_{j,\ stg}$	Junction and Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Note	Units
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient [6]	56.1			°C/W
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	0.34			°C/W
T_{sold}	Maximum Reflow Soldering Temperature	260		MSL3	°C

Electrical Characteristics

(T_J = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 67.4mA	T_J = 25°C	1.2	1.7	2.5	V
			T_J = 150°C		1.6		
I_{DSS}	Drain-Source Leakage Current	V_{DS} = 650V, V_{GS} = 0V	T_J = 25°C		11	143	µA
			T_J = 150°C		29		
I_{GSS}	Gate-Source Leakage Current	V_{GS} = 6V, V_{DS} = 0V, T_J = 25°C			358		µA
$R_{DS(on)}$	Drain-Source On-State-Resistance	V_{GS} = 6V, I_D = 18A	T_J = 25°C		27	35	mΩ
			T_J = 150°C		62		
R_G	Gate Resistance	f = 5MHz; open drain			1.8		Ω
DYNAMIC							
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 400V, f = 100kHz			488		pF
C_{oss}	Output Capacitance				153		
C_{rss}	Reverse Transfer Capacitance				2.67		
$C_{o(er)}$	Effective Output Capacitance Energy Related [7]	V_{GS} = 0V, V_{DS} = 0 to 400V			279		pF
$C_{o(tr)}$	Effective Output Capacitance Time Related [8]				381		
Q_{OSS}	Output Charge				155		nC
SWITCHING							
Q_G	Gate Charge	V_{GS} = 0 to 6V, V_{DS} = 400V, I_D = 18A			14		nC
Q_{GS}	Gate-Source Charge				1.1		
Q_{GD}	Gate-Drain Charge				5.8		
V_{Plat}	Gate Plateau Voltage	V_{DS} = 400V, I_D = 18A			2.3		V

Electrical Characteristics *(Continued)*

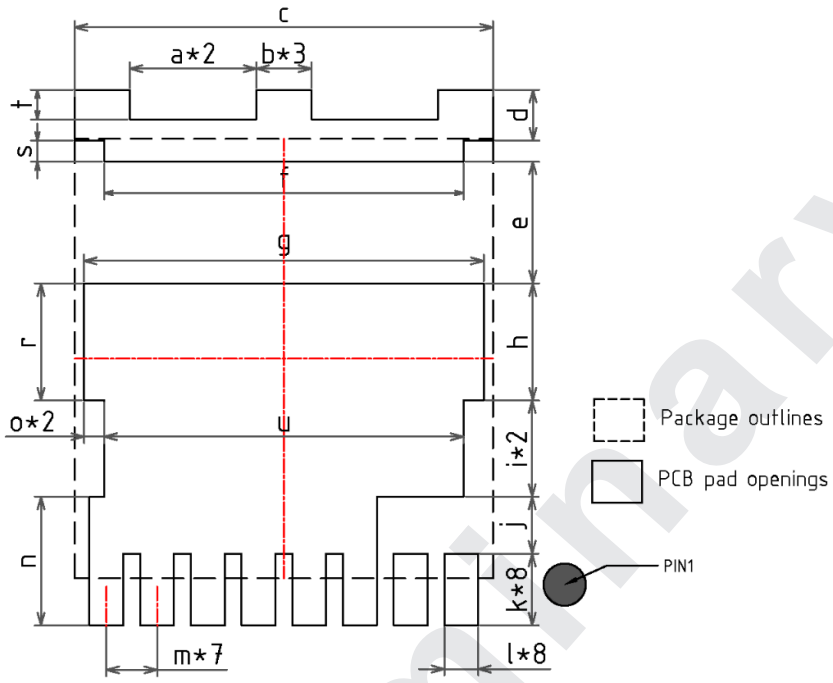
(T_J = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
REVERSE CONDUCTION							
V_{SD}	Source-Drain Reverse Voltage	V_{GS} = 0V, I_S = 18A			2.3		V
$I_{S,\ pulse}$	Reverse Pulsed Current	V_{GS} = 6V, t_{pulse} = 10µs				127	A
Q_{rr}	Reverse Recovery Charge	V_R = 400V, I_{SD} = 18A			0		nC
t_{rr}	Reverse Recovery Time				0		ns
I_{rrm}	Peak Reverse Recovery Current				0		A

Notes:

1. $V_{DS,transient}$ is intended for non-repetitive events, t_{PULSE} < 200µs.
2. $V_{DS,pulse}$ is intended for repetitive pulse, t_{PULSE} < 100ns.
3. Limit was extracted from characterization test, not measured during production.
4. The minimum V_{GS} is clamped by ESD protection circuit, as shown in Figure 8.
5. Power dissipation, and consequently max. current ratings are obtained using max. thermal resistance and max. temperature of 150°C.
6. $R_{\theta JA}$ is determined with the device mounted on one square inch of copper pad, single layer 2oz copper on FR4 board.
7. $C_{O(er)}$ is the fixed capacitance that gives the same stored energy as C_{OSS} while VDS is rising from 0 to 400V.
8. $C_{O(tr)}$ is the fixed capacitance that gives the same charging time as C_{OSS} while VDS is rising from 0 to 400V.

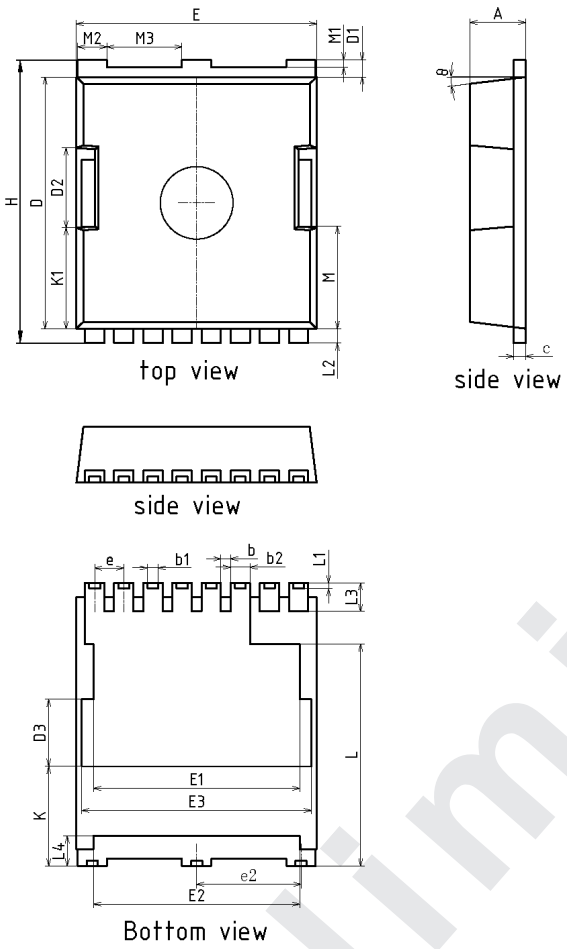
Recommended PCB Footprint



SYMBOL	DIMENSION	SYMBOL	DIMENSION
a	3.00	k	1.70
b	1.30	l	0.80
c	9.90	m	1.20
d	1.20	n	3.05
e	2.88	o	0.48
f	8.50	r	2.77
g	9.46	s	0.50
h	2.77	t	0.70
i	2.28	u	8.50
j	1.35	/	/

Notes:
(1)All dimension are in millimeters.
(2)Drawing is not to scale.

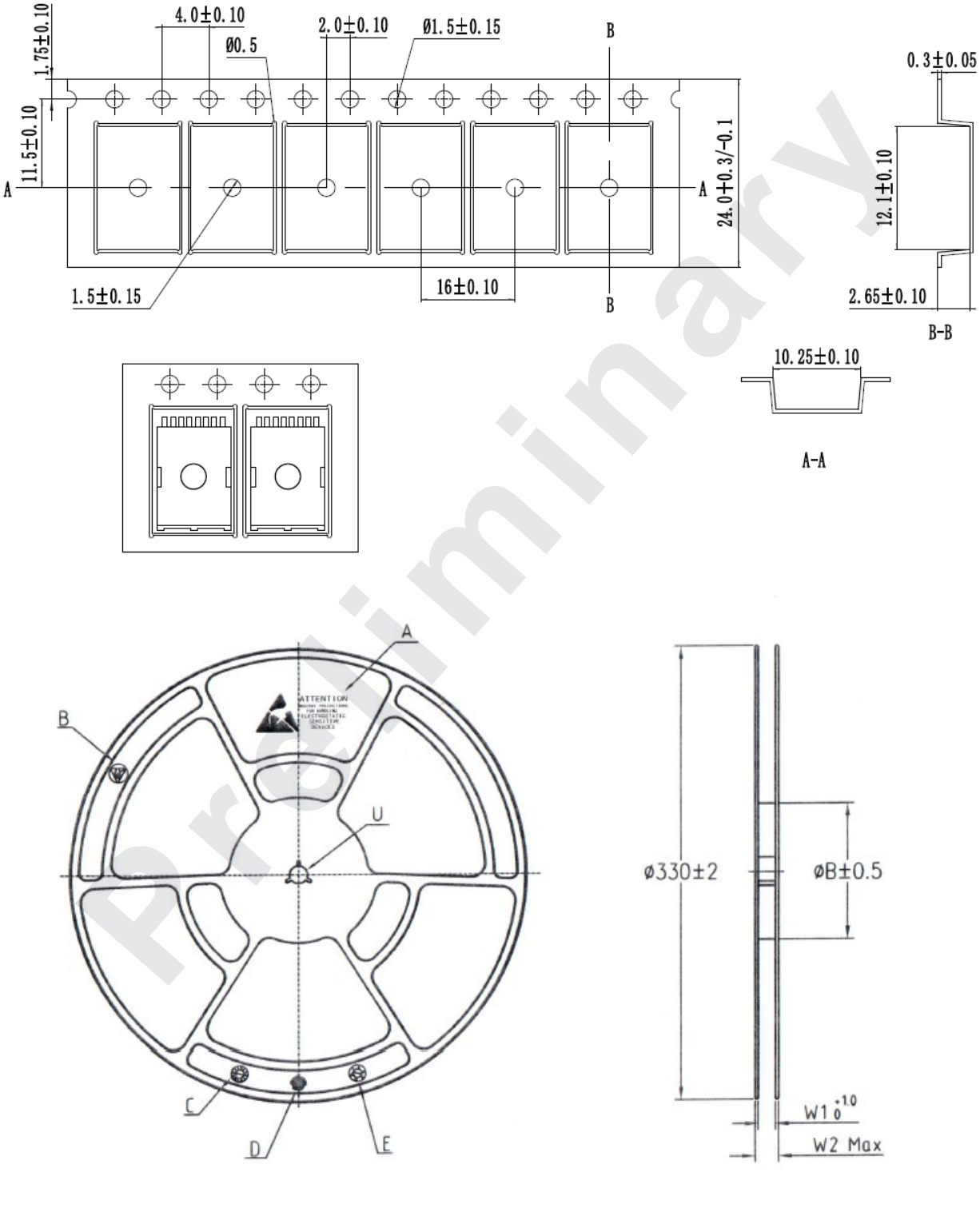
Package Dimensions, TOLL



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.30	2.45
b	0.30	0.40	0.50
b1	0.31	0.43	0.55
b2	0.65	0.80	0.90
c	0.40	0.50	0.60
D	10.18	10.38	10.58
D1	0.50	0.70	0.90
D2	3.30REF		
D3	2.77REF		
E	9.70	9.90	10.10
E1	8.50REF		
E2	8.50REF		
E3	9.46REF		
e	1.10	1.20	1.30
H	11.48	11.68	11.88
K	4.08REF		
K1	4.18REF		
L	9.13REF		
L1	0.23REF		
L2	0.50	0.60	0.70
L3	1.00	1.20	1.40
L4	1.00	1.20	1.40
M	4.18REF		
M1	0.26REF		
M2	1.10	1.20	1.30
M3	3.10REF		
Θ	10.00REF		
e2	4.20	4.30	4.40

Notes:
(1) Dimensioning and tolerancing confirm to ASME Y14.5M-1994
(2) All dimensions are in millimeters, angles are in degrees
(3) Coplanarity applies to the exposed heat slug as well as the terminal
(4) Radius on terminal is optional
(5) General tolerance: ± 0.10 mm

Tape and Reel Dimensions, TOLL



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