ALPHA & OMEGA SEMICONDUCTOR

AOFQ039V15GA1

150V GaN Enhancement-mode Power Transistor

Features

- GaN-on Silicon E-mode HEMT technology
- Very low gate charge
- Ultra low On-resistance
- Very small footprint

Applications

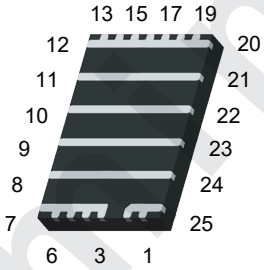
- High frequency DC/DC converter
- Solar systems optimizers and microinverters
- PD charger and PSU synchronous rectification
- Telecom power supply
- Motor driver

Product Summary at T_J = 25°C

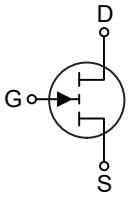
$V_{DS, max}$	150V
$R_{DS(on), max}$ @ V_{GS} = 5V	3.9mΩ
$Q_{g, typ}$ @ V_{DS} = 75V	20nC
$I_{DS, Pulse}$	260A
Q_{oss} @ V_{DS} = 75V	130nC

Pin Configuration

Top View



Bottom View



Pin Information

Pin	Pin Description	Pin Function
1, 2, 25	Gate	Driver Gate
3-7, 9, 11, 21, 23	Source	Source
8, 10, 12-20, 22, 24	Drain	Power Drain

Ordering Information

Ordering Part Number	Package Type	Form	Shipping Quantity
AOFQ039V15GA1	FCQFN4x6	Tape and Reel	1500

Contact local sales office for full product datasheet.

Absolute Maximum Ratings

(T_J = 25°C, unless otherwise noted)

Symbol	Parameter	AOFQ039V15GA1	Units
V_{DS}	Drain-Source Voltage (Continuous)	150	V
$V_{DS(tr)}$	Drain-Source Voltage (up to 300,000 5ms pulse at 150°C)	180	
I_D	Continuous Drain Current	100	A
	Pulsed (25°C, T_{Pulse} = 100µs)	260	
V_{GS}	Gate-Source Voltage	-4 to 6	V
$T_{j, stg}$	Operating and Storage Temperature	-40 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Note	Units
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient (1)	57.56			°C/W
$R_{\theta JB}$	Thermal Resistance Junction-to-Board	1.92			°C/W
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	13.96			°C/W
T_{sold}	Maximum Reflow Soldering Temperature	260		MSL3	°C

Electrical Characteristics

(T_J = 25°C, unless otherwise noted)

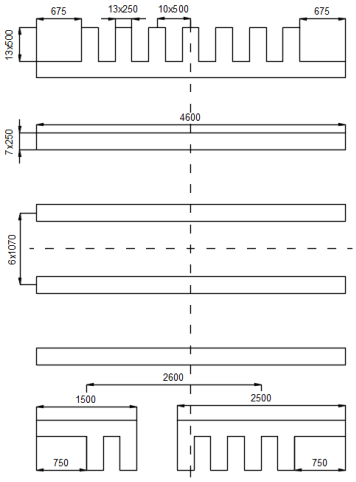
Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Voltage	V_{GS} = 0 V, I_D = 500µA	150			V
I_{DSS}	Drain-Source Leakage	V_{DS} = 150V, V_{GS} = 0V		2	150	µA
I_{GSS}	Gate-Source Forward Leakage	V_{GS} = 5V		2	100	µA
	Gate-Source Forward Leakage	V_{GS} = 6V		6	1000	µA
	Gate-Source Reverse Leakage	V_{GS} = -4V		0.1	100	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 12mA	0.8	1.1	2.1	V
$R_{DS(on)}$	Drain-Source On-State-Resistance	V_{GS} = 5V, I_D = 30A		3.2	3.9	mΩ
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5A,V_{GS} = 0V		1.5		V
DYNAMIC						
C_{ISS}	Input Capacitance	V_{GS} = 0V, V_{DS} = 75V		2200		pF
C_{OSS}	Output Capacitance	V_{GS} = 0V, V_{DS} = 75V		900		
C_{RSS}	Reverse Transfer Capacitance	V_{GS} = 0V, V_{DS} = 75V		10.5		
$C_{OSS(ER)}$	Energy Related C_{OSS}	V_{GS} = 0V, V_{DS} = 0V to 75V		1300		
$C_{OSS(TR)}$	Time Related C_{OSS}	V_{GS} = 0V, V_{DS} = 0V to 75V		1700		
R_G	Gate Resistance	f = 5MHz, open drain		2		Ω
Q_G	Total Gate Charge	V_{GS} = 5V, V_{DS} = 75V, I_D = 30A		20		nC
Q_{GS}	Gate-Source Charge	V_{DS} = 75V, I_D = 30A		5		
Q_{GD}	Gate-Drain Charge	V_{DS} = 75V, I_D = 30A		3.5		
$Q_{G(TH)}$	Gate Charge at Threshold	V_{DS} = 75V, I_D = 30A		3		
Q_{OSS}	Output Charge	V_{GS} = 0V, V_{DS} = 75V		130		

Note:

1. $R_{\theta JA}$ is determined with the device mounted on one square inch of copper pad, single layer 2oz copper on FR4 board.

Land Pattern, FCQFN4x6

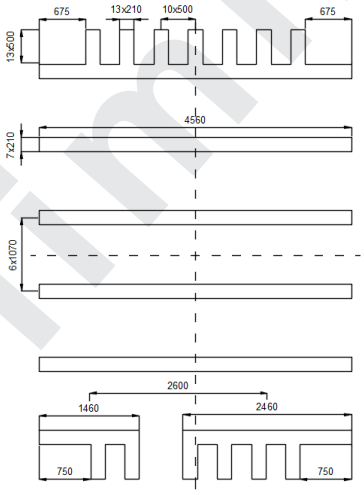
Recommended Land Pattern



TOP VIEW

Unit: μm

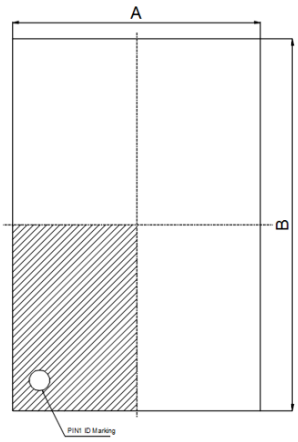
Recommended Stencil Drawing



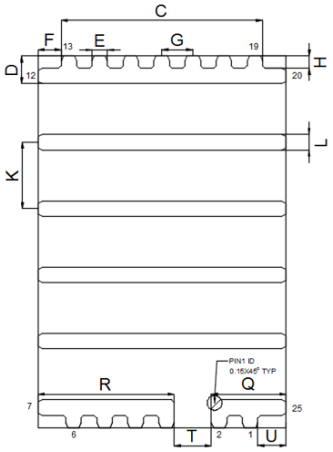
TOP VIEW

Unit: μm

Package Dimensions, FCQFN4x6

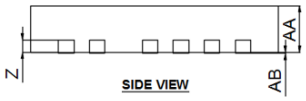


TOP VIEW



BOTTOM VIEW

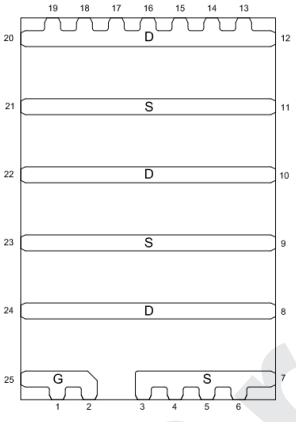
SYMBOL	MILLIMETER			NOTE
	MIN	NOM	MAX	
A	3.9	4.0	4.1	
B	5.9	6.0	6.1	
C	3.15	3.25	3.35	
D	0.35	0.45	0.55	3X
E	0.20	0.25	0.30	13X
F		0.375 REF		2X
G		0.5 BASIC		10X
H		0.2 REF		3X
K		1.07 BASIC		6X
L	0.20	0.25	0.30	4X
Q	1.1	1.2	1.3	
R	2.1	2.2	2.3	
T	0.55	0.60	0.65	
U		0.45 REF		2X
Z		0.203 REF		7X
AA	0.75	0.85	0.95	
AB	0.00	0.02	0.05	



SIDE VIEW

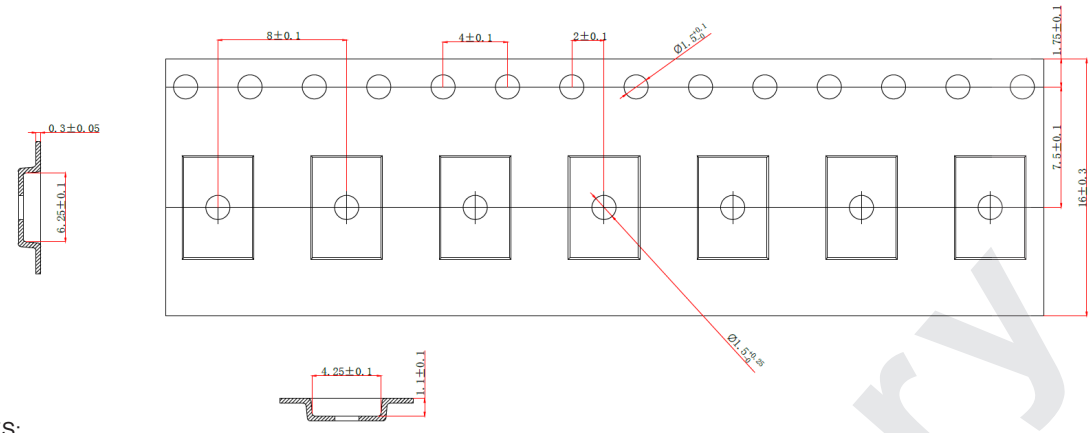
NOTE:
1)ALL DIMENSION ARE IN MILLIMETERS.
2)BOTTOM VIEW IS FT TESTER SIDE VIEW.
3)LEAD COPLANARITY SHALL BE 0.08 MILLIMETERS MAX.
4)COMPLIES WITH JEDEC MO-220.
5)DRAWING IS NOT TO SCALE.

PIN Configuration



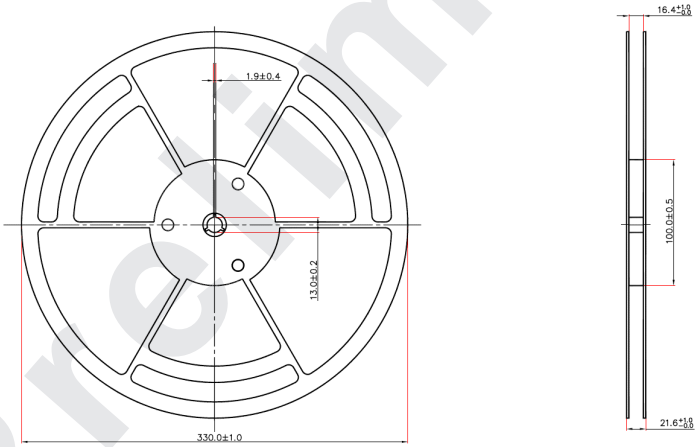
TOP VIEW

Tape and Reel Dimensions, FCQFN4x6



NOTES:

1. CARRIER TAPE COLOR: BLACK.
2. COVER TAPE WIDTH: 13.3±0.10.
3. COVER TAPE COLOR: TRANSPARENT.
4. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.20 MAX.
5. CAMBER NOT TO EXCEED 1MM IN 100MM.
6. MOLD# QFN/DFN/MIS6X4X0.75/0.85.
7. ALL DIMS IN MM.
8. BAN TO USE THE ENVIRONMENT-RELATED SUBSTANCES OF JCET PRESCRIBING.



NOTES:

1. 2500 UNITS PER TRAY.
2. COLOR: WHITE.
3. ALL DIM IN mm.
4. GENERAL TOLERANCE±0.25.
5. BAN TO USE THE ENVIRONMENT-RELATED SUBSTANCES OF JCET PRESCRIBING.
6. THE DIRECTION OF VIEW:

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