

Introduction to Package TOLL-8L



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GOFORD

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一、Project Introduction

1.1 Product Features

TOLL(TO Lead Less) becomes a popular package for power semiconductor devices due to its excellent electrical performance, thermal performance, small size, and high reliability

	D ² PAK	D ² PAK 7pin	TO-LeadLess
			
Power Density	★★	★★★	★★★★
Current Capability	★★	★★★	★★★★
Thermal Performance	★	★★	★★★
Height	★	★	★★★
Reliability	★★★	★★★	★★★★



The rapid development of new energy products (EV, energy storage, and supporting applications), high-power supplies, and motors has further improved the requirements for product energy efficiency. MOSFET need to withstand transient high energy flow and achieve the highest heat dissipation rate and the lowest thermal resistance within a limited physical heat dissipation limit of the material. Under this limit, the ultra-low conduction impedance and parasitic inductance, as well as better EMI performance and thermal performance of TOLL packages, just meet the requirements of this development trend. Secondly, the actual circuit design and application of TOLL packages require fewer parallel and heat dissipation components, which can save PCB space, Thereby improving overall reliability.

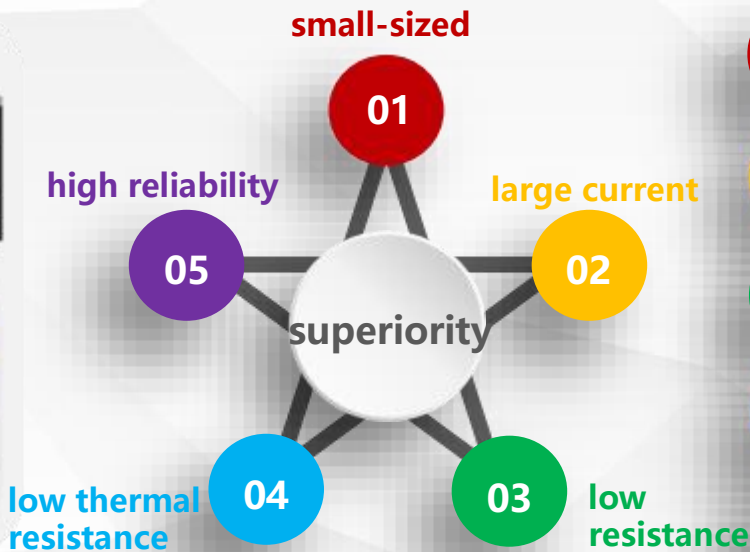
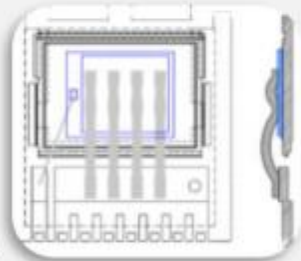


— 、Project Introduction

1.2 TOLL MOSFET Advantages

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Aluminum wire
bonding



01

Small size

Compared to D2PAK, size decreases by 60%

02

Large current carrying capacity

TOLL current carrying capacity up to 300A

03

Low conduction resistance

Compared to D2PAK, the interconnection conduction resistance decreases by 30%

04

Low thermal resistance

Compared to D2PAK, the thermal resistance of the product decreases by 20%

05

High board level reliability

Compared to D2PAK, the welding area of the pin increases by 55.6%

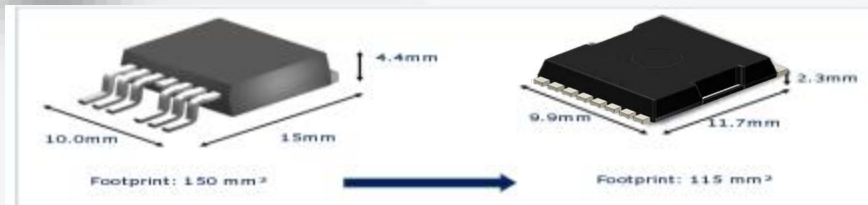


1.2 TOLL MOSFET Advantages

01

Small device size

Compared to D2PAK, size decreases by 60%

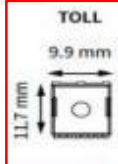
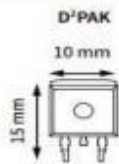
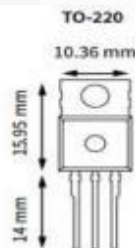
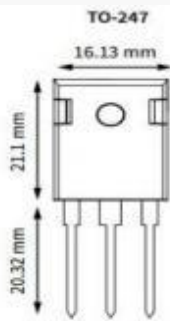


30%
Footprint
Reduction

50%
Height
Reduction



60%
Space
reduction



30% footprint reduction

50% footprint reduction

02

Large device current carrying capacity

TOLL current carrying capacity up to 300A

		D ² PAK	D ² PAK 7pin	TOLL
lowest R _{DS(on)}	30V	3.4 mΩ	0.9 mΩ	0.4 mΩ
	60V	1.9 mΩ	1.0 mΩ	0.75 mΩ
	100V	2.7 mΩ	2.5 mΩ	2.0 mΩ
	150V	7.2 mΩ	6.5 mΩ	5.9 mΩ
Package Resistance		0.74 mΩ	0.44 mΩ	0.25 mΩ
Current Capability		120A	180 A	300 A
Footprint		150 mm ²	150 mm ²	115 mm ²
Inductivity		5 nH	5 nH	1-2 nH



1.2 TOLL MOSFET Advantages

GOFORD

03

Low device conduction resistance

Compared to D2PAK, the interconnection conduction resistance decreases by 30%



04

Low device thermal resistance

Compared to D2PAK, the thermal resistance of the product decreases by 20%



TOLL package combines size and thermal resistance perfectly, compared to D2PAK, the thermal resistance of the product decreases by 20%

GOFORD SEMICONDUCTOR



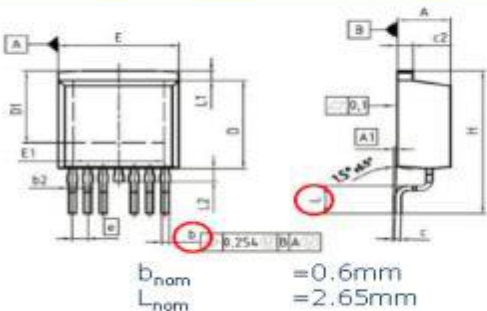
1.2 TOLL MOSFET Advantages

05

High device board level reliability

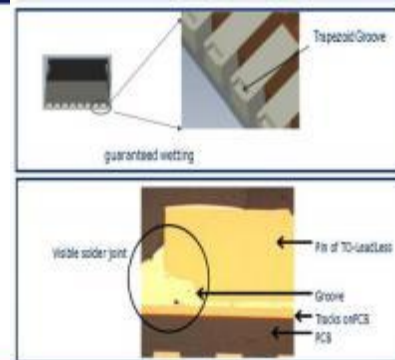
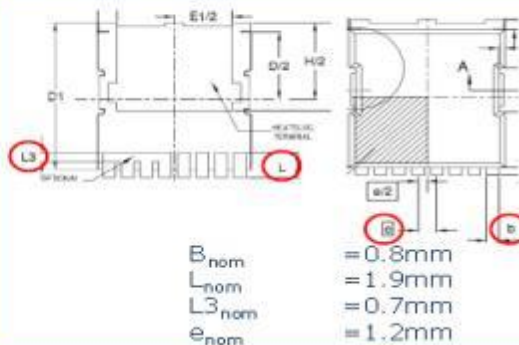
TOLL adopts a Wettable flange structure, which increases the pins' welding area by 55.6%, allowing for a lower current density, avoiding electromigration problems under high currents and temperatures, that improving reliability

D2PAK 7Pin



Contact/Solder area **D2PAK 7Pin:**
 $= 2.65mm * 0.6mm * 5$
 $= 7.95mm^2$

TO -LeadLess

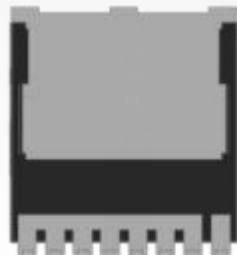
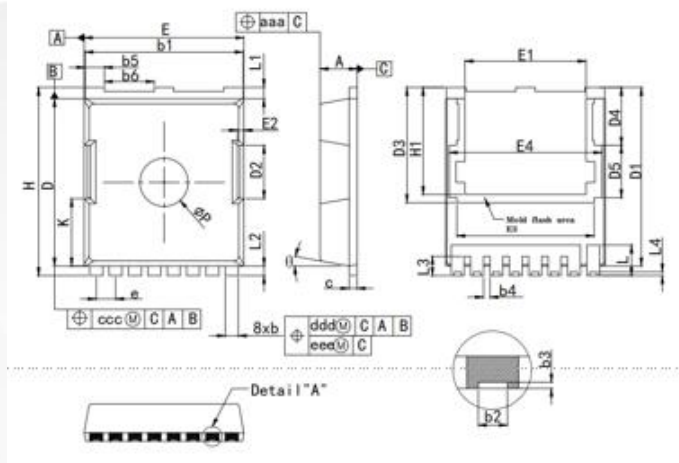
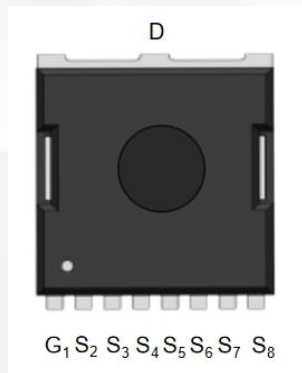


Contact/Solder area **TOLL:**
 $\sim 1.9mm * 0.8mm * 7 + 0.7mm * 0.4mm * 6$
 $= 12.32mm^2$



一、Project Introduction

1.3 Product Size



SYMBOL	COMMON		
	MILLIMETER		
	MIN	NOMINAL	MAX
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.36	0.45	0.55
b3	0.05	0.100	/
b4	0.30	0.40	0.50
b5	1.10	1.20	1.30
b6	3.00	3.10	3.20
c	0.40	0.50	0.60
D	10.28	10.38	10.55
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3		7.15	
D4		3.59	
D5		3.26	
e	1.10	1.20	1.30
E	9.80	9.90	10.00
E1	7.40	7.50	7.60
E2	0.30	0.40	0.50
E3		8.50	
E4		9.46	
H	11.50	11.68	11.85
H1	0.55	0.65	0.75
K	4.08	4.18	4.28
L	1.60	1.90	2.10
L1	0.50	0.70	0.90
L2	0.50	0.60	0.70
L3	1.00	1.20	1.30
L4	0.13	0.23	0.33
P	2.85	3.00	3.15
j		10° REF	
aaa		0.20	
ccc		0.20	
ddd		0.25	
eee		0.20	



二、TOLL MOSFET Application



EV



PV



Power transmission



communication



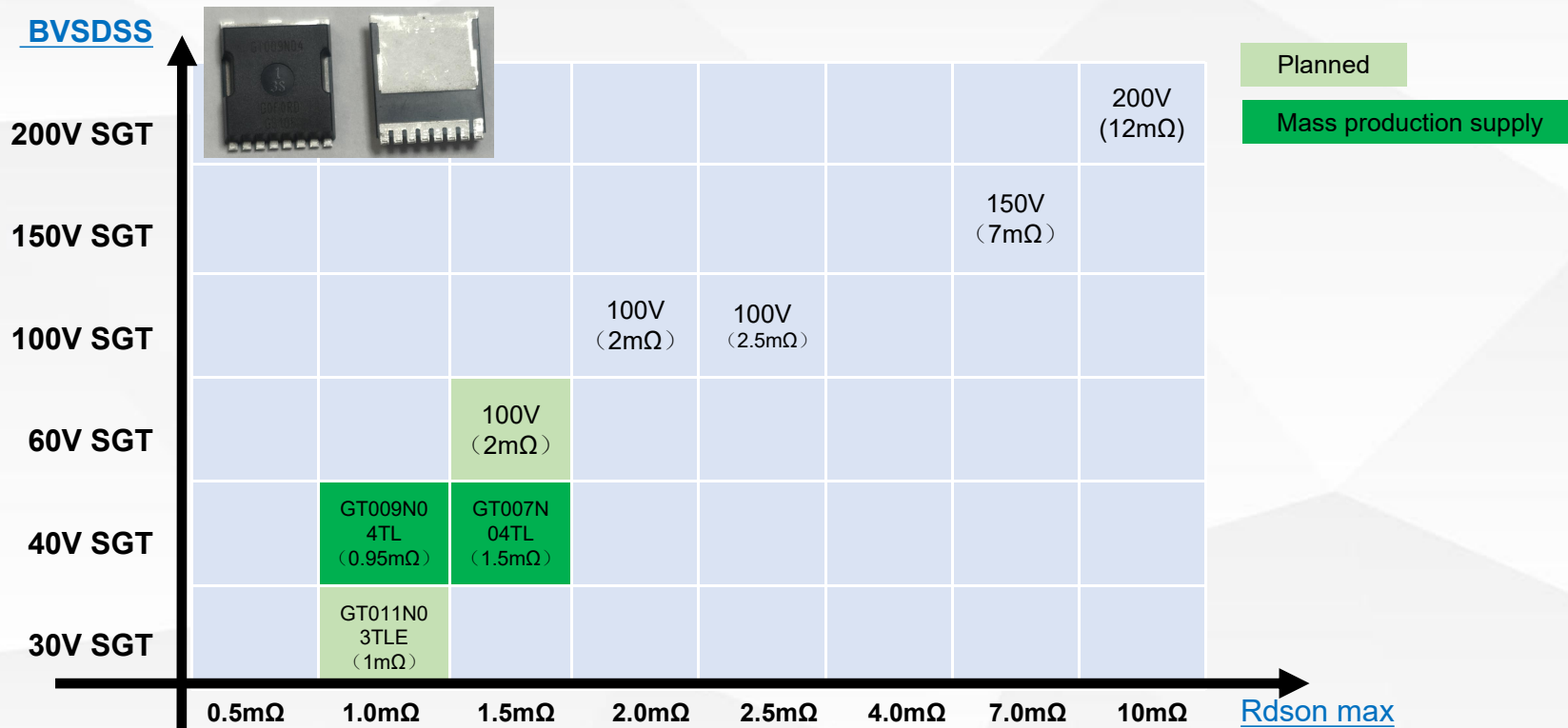
UPS source



TOLL products are widely used in switches Power supply, data center (server power supply, etc.), charging station, power regulators for photovoltaic generators, and uninterruptible power supply systems (UPS).



三、TOLL MOSFET Planning





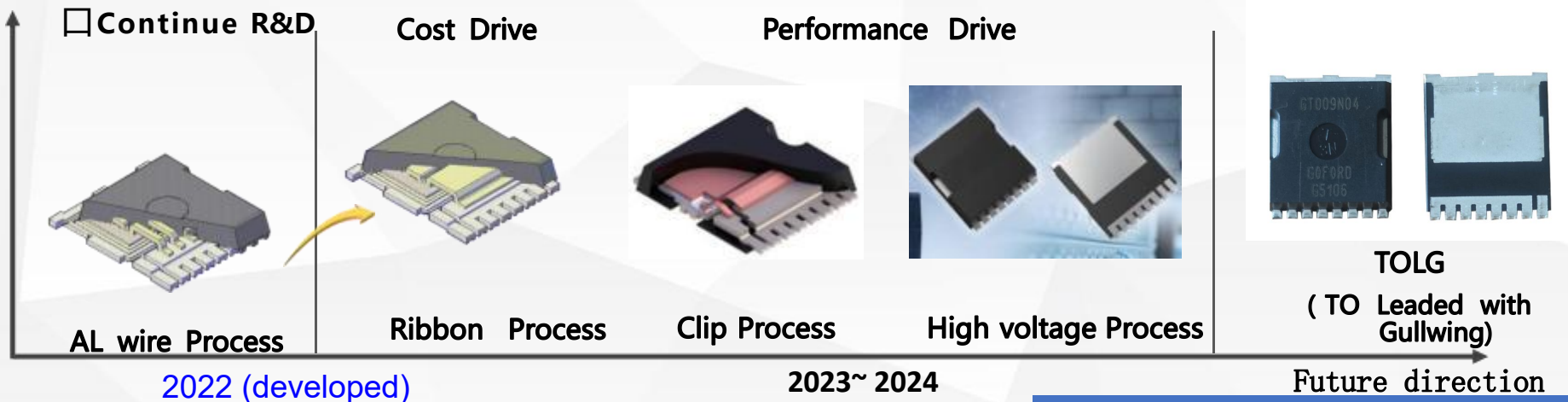
四、TOLL develop roadmap

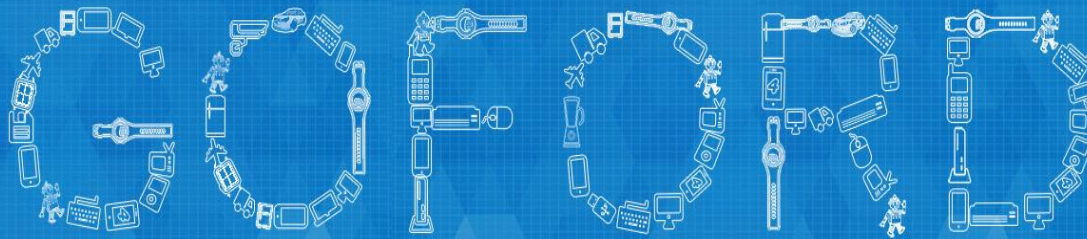
□ Brief summary

TOLL is a high-end MOSFET product with advanced technology. It will strengthen GOFORD competitiveness and increment close cooperation with customers.

In order to better serve the market, Goford will introduce TOLL Ribbon, TOLL Clip, and TOLL high-voltage products to meet the diversified market demands.

□ Continue R&D





THANKS