



BMNE041N65

本产品符合AEC-Q101 标准要求

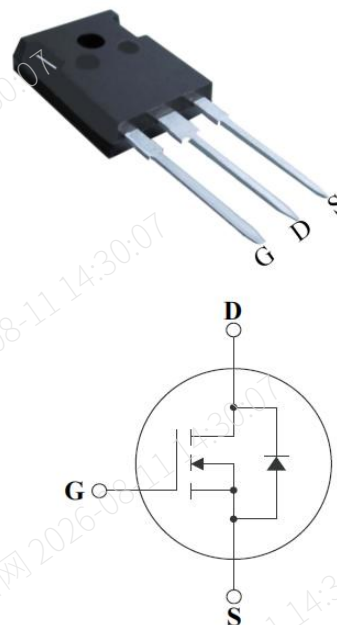
Specifically designed for Automotive applications, this SUPERFET MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per unit area.

本产品是一款专为汽车应用设计的超级结 MOSFET 产品，采用了最先进的工艺技术，产品的单位面积导通电阻低。

Features:

特性

- 650V Drain-Source Voltage
650V的漏极-源极电压
- Ultra Low Gate Charge
超低栅极电荷
- Low Effective Output Capacitance
低的有效输出电容
- 100% Avalanche Tested
100%通过雪崩测试



Applications:

应用

- EV Charger
汽车充电器
- Industrial Power Supplies
工业电源
- Solar
太阳能

Type 型号	$V_{DS}[V]$ 漏极-源极电压	$R_{DSon} [m\Omega]$ 导通电阻	$T_{Jmax}[^{\circ}C]$ 最高结温	Marking 标记	Package 封装
BMNE041N65	650	41	150	041N65	TO-247-3L



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Maximum Rated Values

最大额定参数

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Drain to Source Voltage, $T_j \geq 25^\circ\text{C}$ 漏极-源极电压, $T_j \geq 25^\circ\text{C}$	V_{DSS}	650	V
Gate to Source Voltage, (static) 栅极-源级极电压, 静态	V_{GSS}	± 30	V
Gate to Source Voltage, (AC, $f > 1\text{Hz}$) 栅极-源级极电压, (AC, $f > 1\text{Hz}$)		± 30	
Drain Current, $T_c = 25^\circ\text{C}$ 集电极电流, $T_c = 25^\circ\text{C}$	I_{D}	80	A
Drain Current, $T_c = 100^\circ\text{C}$ 集电极电流, $T_c = 100^\circ\text{C}$		50	
Pulsed Drain Current, t_p limited by $T_{j\text{max}}$ 集电极脉冲电流, 脉宽时间受 $T_{j\text{max}}$ 限制	$I_{\text{D,pulse}}$	255	
Single Pulsed Avalanche Energy, $T_c = 25^\circ\text{C}$ 单脉冲雪崩能量, $T_c = 25^\circ\text{C}$	E_{AS}	2608	mJ
Single Pulsed Avalanche Current, $T_c = 25^\circ\text{C}$ 单脉冲雪崩电流, $T_c = 25^\circ\text{C}$	I_{AS}	12	A
MOSFET dv/dt ruggedness	dv/dt	26	V/ns
Power Dissipation, $T_c = 25^\circ\text{C}$ 常温耗散功率, $T_c = 25^\circ\text{C}$	P_{D}	455	W
Maximum Junction Temperature 最高结温	$T_{j\text{max}}$	150	$^\circ\text{C}$
Operating Junction Temperature 工作结温	T_j	$-55 \dots +150$	
Storage Temperature 储存温度	T_{STG}	$-55 \dots +150$	

Thermal Resistance

热阻

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Thermal Resistance, Junction to Case, Max. 结-管壳热阻	$R_{\theta\text{JC}}$	0.205	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient, Max. 结-环境热阻	$R_{\theta\text{JA}}$	62	$^\circ\text{C/W}$



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Electrical Characteristic at $T_j = 25^\circ\text{C}$ (unless otherwise specified)

$T_j=25^\circ\text{C}$ 时电学特性（除非特别声明）

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	
Static Characteristic 静态特性						
Drain to Source Breakdown Voltage 漏极-源极电压击穿电压	BV _{DSS}	V _{GS} =0V, I _D =1mA	650	-	-	V
Zero Gate Voltage Drain Current 栅源短路的漏极电流	I _{DSS}	V _{DS} =650V, V _{GS} =0V	-	-	5	uA
Gate to Body Leakage Current 栅-源漏泄电流	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	-	-	100	nA
Static Drain-source On Resistance 漏-源通态电阻	R _{DS(on)}	V _{GS} =10V, I _D =32.5A	-	33	41	mΩ
Gate Threshold Voltage 栅-源阈值电压	V _{GS(th)}	V _{DS} =V _{GS} , I _D =6.5mA	3.0	-	5.0	V
Gate Resistance 栅极电阻	R _g	f=1MHz, open drain	-	1.9	-	Ω
Dynamic Characteristic 动态特性						
Input capacitance 输入电容	C _{iss}	V _{GS} =0V, V _{DS} =400V, f=200KHz	-	7372	-	pF
Output capacitance 输出电容	C _{oss}		-	167	-	
Reverse transfer capacitance 反向传输电容	C _{rss}		-	12	-	
Total Gate Charge 栅极总电荷	Q _{g(tot)}	V _{DD} =400V, I _D =24A, V _{GS} =10V	-	141.8	-	nC
Gate to Source Gate Charge 栅极-源级电荷	Q _{gs}		-	38.6	-	
Gate to Drain Charge 栅极-漏极电荷	Q _{gd}		-	72.7	-	

Switching Characteristic at $T_j=25^\circ\text{C}$ (Inductive Load)

$T_j=25^\circ\text{C}$ 时开关特性（电感负载）

Parameter	Symbol	Conditions	Value	Unit
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参数	符号	条件	值			单位
			Min. 最小值	Typ. 典型值	Max. 最大值	

MOSFET Characteristic

MOSFET 特性

Turn-on delay time 开通延迟时间	$t_{d(on)}$	$V_{DD}=480V,$ $V_{GS}=13V,$ $I_D=25A,$ $R_G=1.8\Omega$	-	67.6	-	ns
Rise time 上升时间	t_r		-	29.8	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	30	-	
Fall time 下降时间	t_f		-	26.8	-	

SOURCE-DRAIN DIODE CHARACTERISTICS

源极-漏极二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$I_F=25A,$ $di_F/dt=100A/\mu s$	-	153.5	-	ns
Recovered charge 恢复电荷	Q_{rr}		-	1.2	-	μC
Peak reverse recovery current 反向峰值电流	I_{rrm}		-	14	-	A
Source to Drain Diode Forward Voltage 源极-漏极正向电压	V_{SD}	$V_{GS}=0V,$ $I_D=32.5A$	-	0.9	1.3	V



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ELECTRICAL CHARACTERISTICS

特性曲线

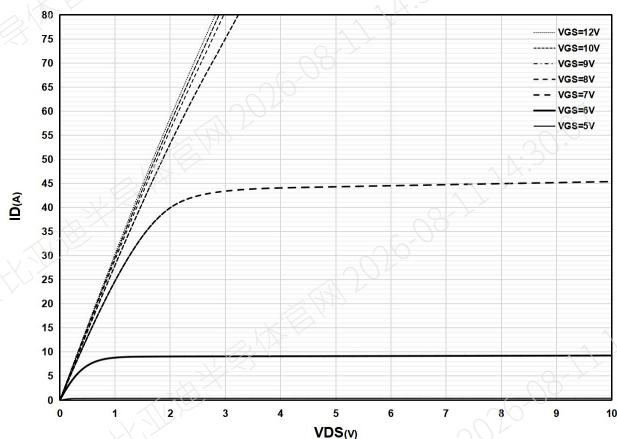


Figure 1. Typical output characteristics($T_j=25^{\circ}\text{C}$)

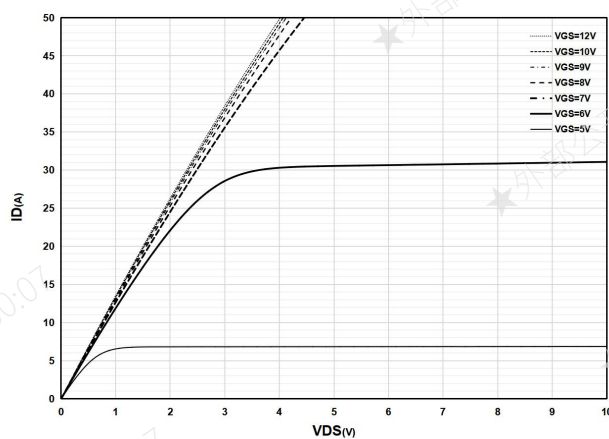


Figure 2. Typical output characteristics($T_j=150^{\circ}\text{C}$)

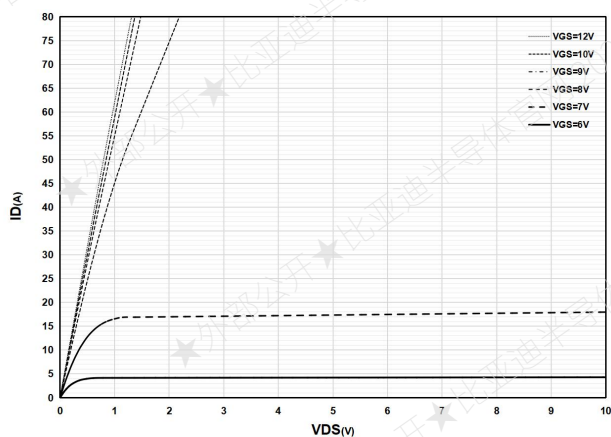


Figure 3. Typical output characteristics($T_j=-55^{\circ}\text{C}$)

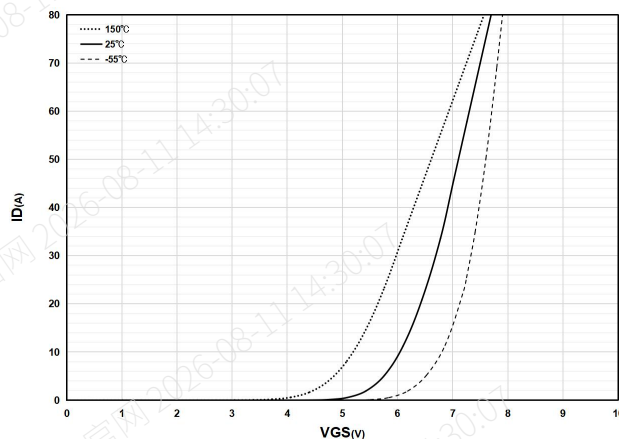


Figure 4. Typical transfer characteristics($V_{DS}=10\text{V}$)

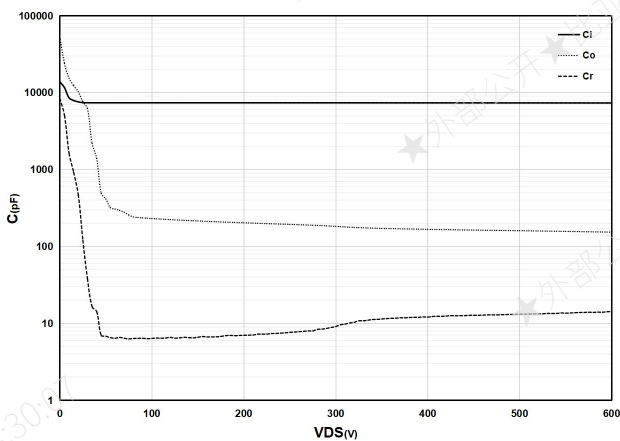


Figure 5. Typical capacitance as a function of drain-source voltage($f=200\text{KHz}$, $V_{GS}=0\text{V}$)

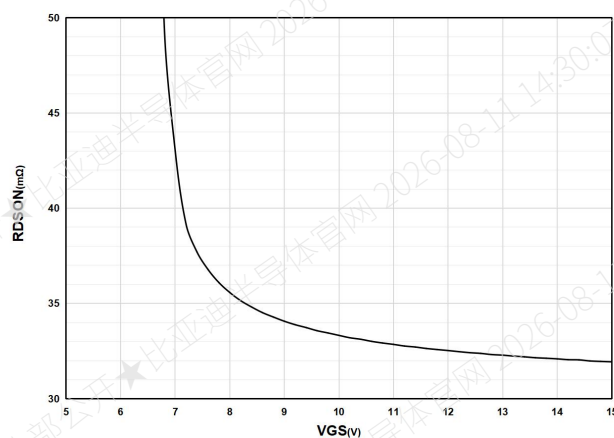


Figure 6. Typical drain-source on-state resistance as a function of gate-source voltage($I_D=32.5\text{A}$)



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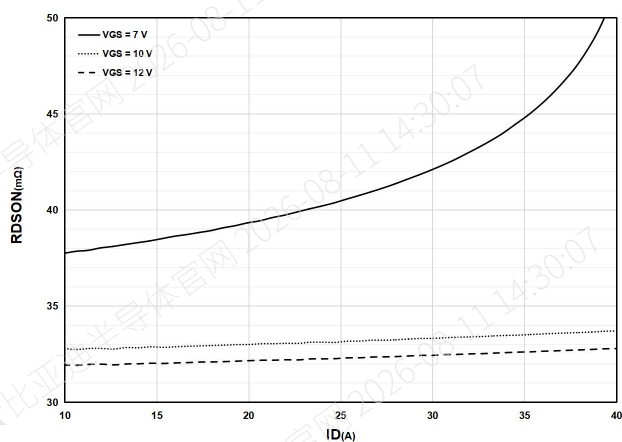


Figure 7. Typical drain-source on-state resistance as a function of drain current

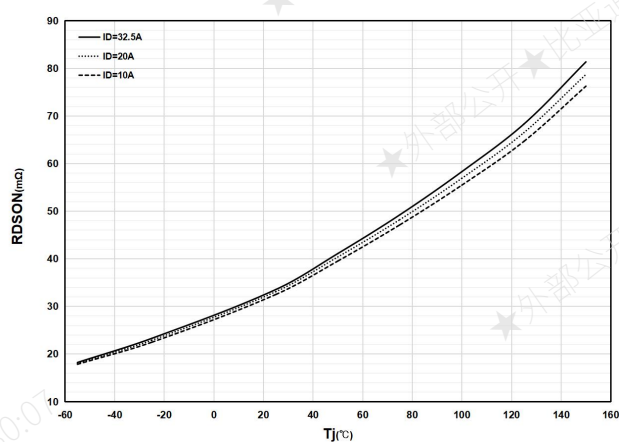


Figure 8. Typical drain-source on-state resistance as a function of junction temperature ($V_{GS}=10V$)

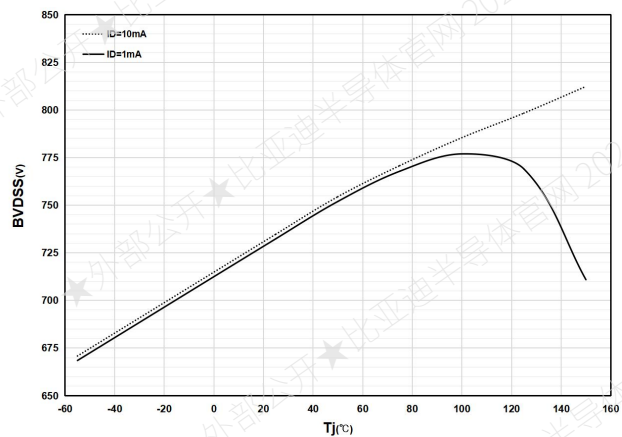


Figure 9. Typical drain-source breakdown voltage as a function of junction temperature

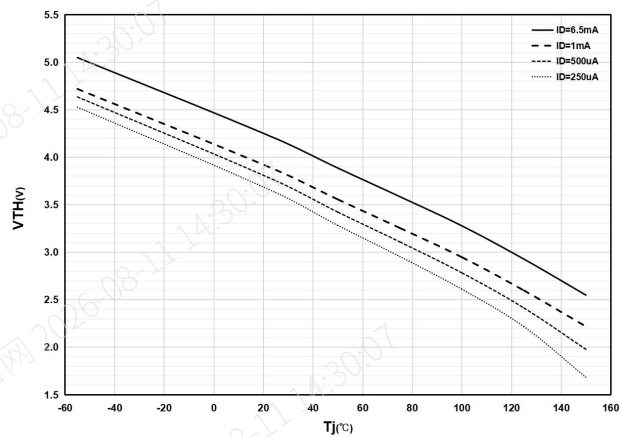


Figure 10. Typical gate threshold voltage as a function of junction temperature

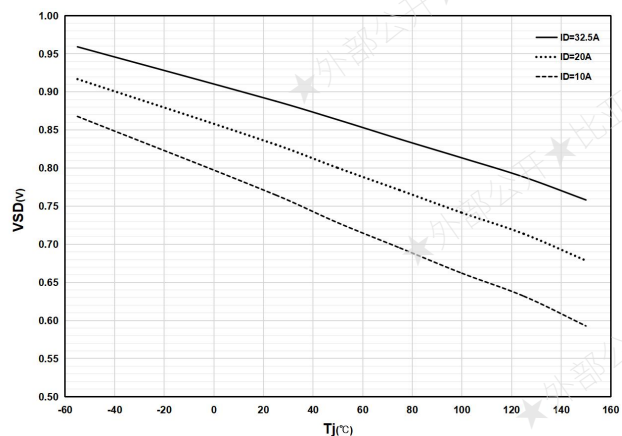


Figure 11. Typical source-drain diode forward voltage as a function of junction temperature

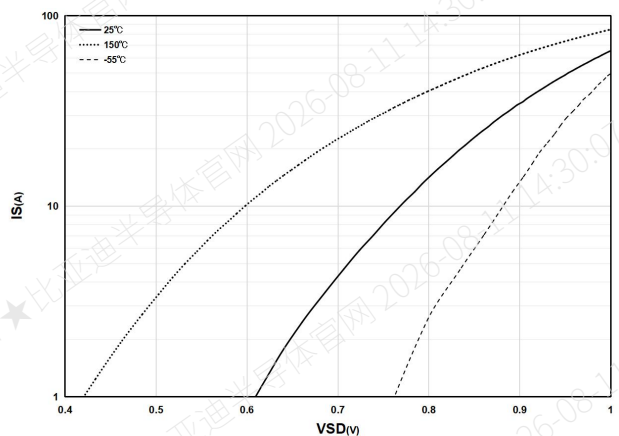


Figure 12. Typical forward characteristics of reverse diode



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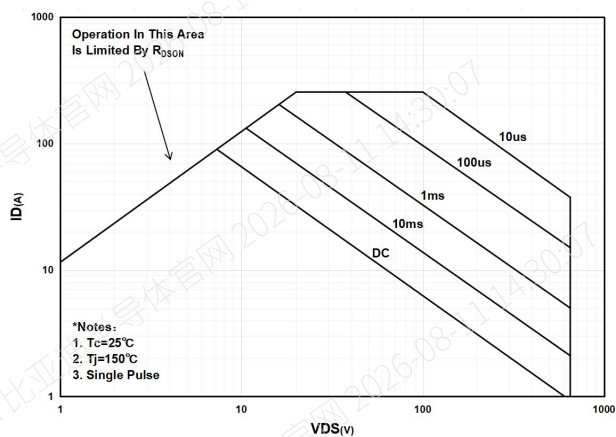


Figure 13. Safe operating area

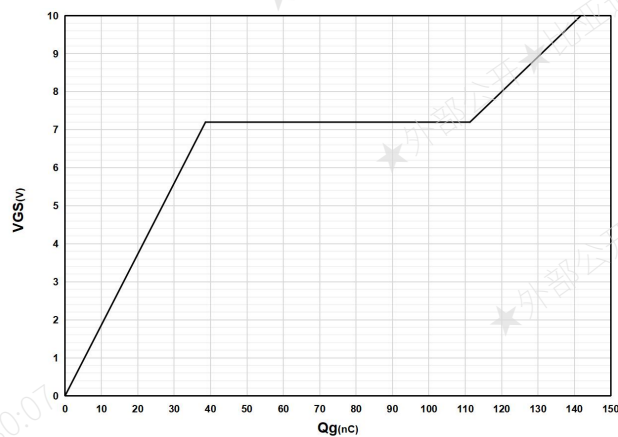


Figure 14. Typical gate Charge ($V_{DS}=400\text{V}$, $I_D=24\text{A}$)

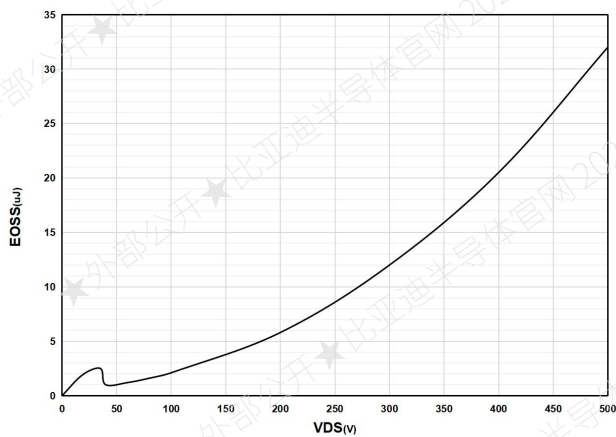


Figure 15. Typical Coss stored energy



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TEST CIRCUITS & WAVEFORMS

测试电路与波形

Diode characteristics

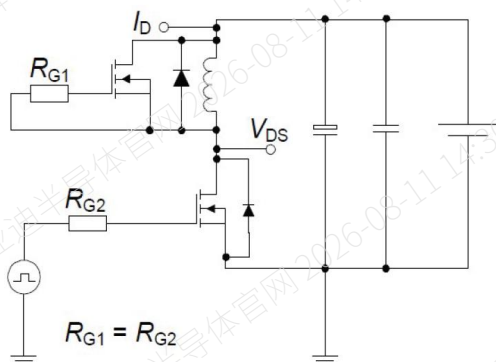


Figure 1. Test circuit for diode characteristics

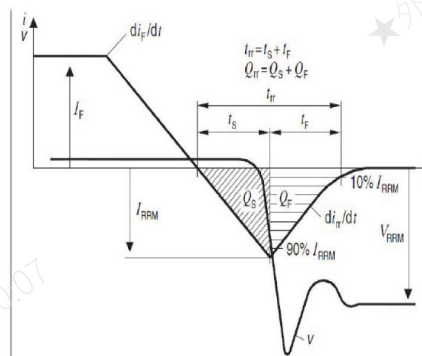


Figure 2. Diode recovery waveform

Switching time

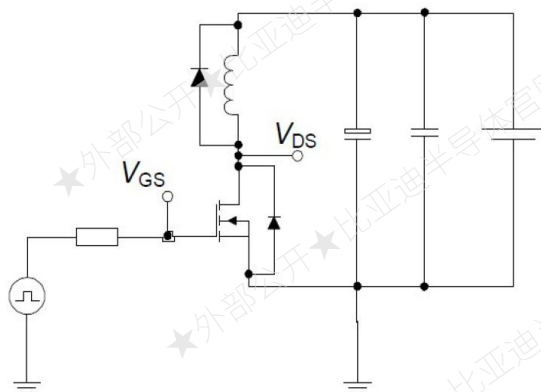


Figure 3. Switching time test circuit for inductive load

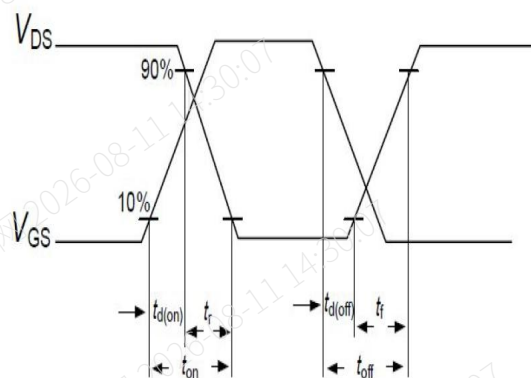


Figure 4. Switching time waveform

Unclamped inductive load

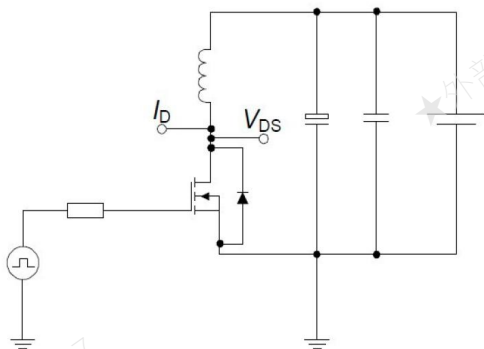


Figure 5. Unclamped inductive load test circuit

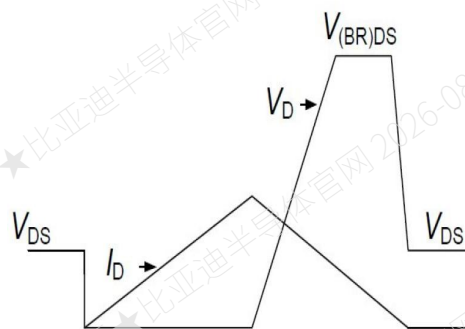


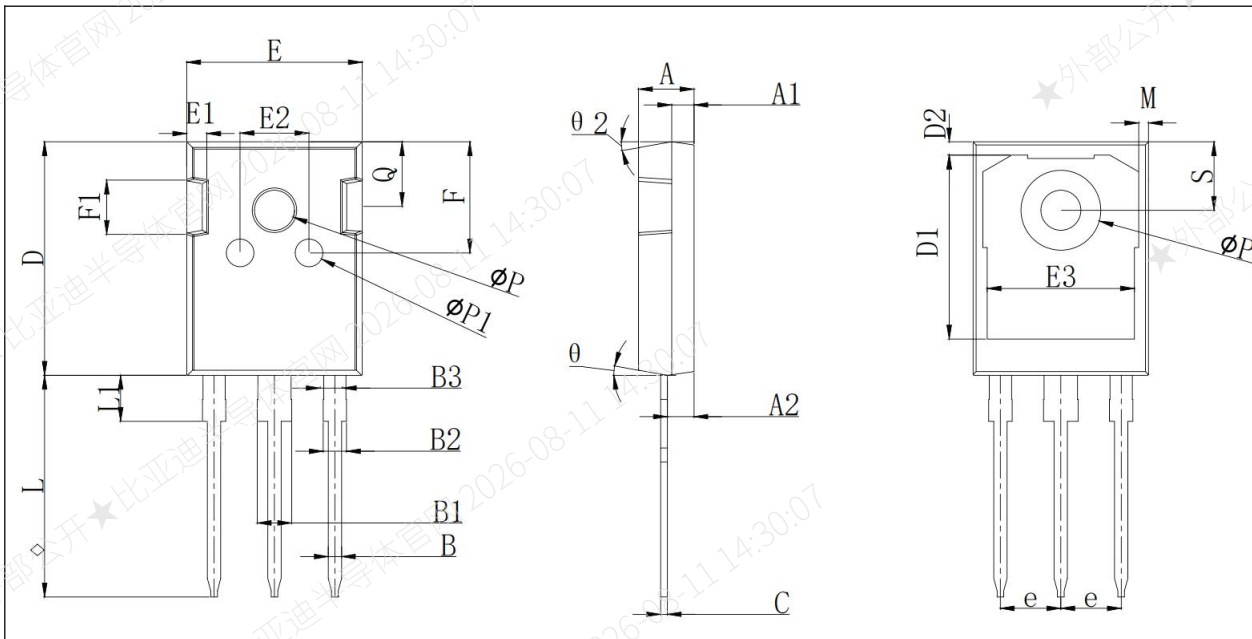
Figure 6. Unclamped inductive waveform



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TO-247-3L Outline Dimensions:

TO-247-3L 外形尺寸



Common Dimensions
(Units:Millimeter)

Symbol	Min.	Max.	Symbol	Min.	Max.
A	4.85	5.15	E3	13.06	13.50
A1	1.90	2.10	F	9.80	10.20
A2	2.20	2.60	F1	4.00	5.30
B	1.00	1.40	e	5.39	5.49
B1	2.80	3.25	L	19.72	21.00
B2	1.80	2.20	L1	3.90	4.80
B3	1.90	2.10	phi P	3.50	3.70
C	0.50	0.70	phi P1	2.40	2.60
D	20.30	21.10	phi P2	7.10	7.30
D1	16.35	16.75	Q	5.40	5.98
D2	1.02	1.32	S	6.05	6.27
E	15.45	15.90	theta	5°	11°
E1	1.20	2.60	theta 2	9°	17°
E2	6.10	6.30			

Note: The mold may vary little from different packaging plants, please refer to the actual product.

备注：因各封装厂的模具存在细微差异，请以实物的尺寸为准。

Packing

包装

Packing 包装	pcs/tube 个/料管	tube /inner box 料管/内盒	inner box/carton 内盒/箱	pcs/carton 个/箱
Tube	30	12	6	2160



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DISCLAIMER 免责声明

- Warranty Period: Unless otherwise agreed in the COOPERATION AGREEMENT or other WRITTEN DOCUMENTS, the Warranty Period for products specified in this specification shall be one year from the date of purchase if the products are properly preserved.

Special instructions: Storage Temperature: $20\pm 5^{\circ}\text{C}$; Relative Humidity: 30%-60%; The product should be stored in a place away from direct light and vibration.

质保期: 除双方合作协议或其他书面文件中另行约定外, 产品妥当保存的情况下自购买之日起, 本规格书所述产品质保期为一年。

特殊说明: 储存温度: $20\pm 5^{\circ}\text{C}$; 相对湿度: 30%-60%; 产品应放置于避光地方, 避免震动。

- Our Company is committed to enhancing product quality and stability. This specification serves solely to delineate technical product details.

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- The Company shall not be held liable for any product damage or consequential incidents resulting from usage beyond the recommended storage conditions, operating parameters, or absolute maximum ratings (or other explicitly stated limits) specified in this specification. Customers must strictly adhere to the operational procedures and conditions outlined in the latest version of the specification when utilizing or testing the product. Customers are responsible for complying with safety standards, including but not limited to redundant design, fire prevention measures, and fault prevention, to design



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and maintain a safe and stable system environment. Customers must verify all functionalities described in this specification before or during actual application to ensure product suitability, safety (preventing potential accidents, fires, or public harm etc.), and reliability. It is recommended that Customers consult our company prior to testing to confirm whether the product information adequately covers the application requirements.

任何超出本文件中建议存储条件、使用条件及绝对最大额定参数条件（或部分明确值）使用，造成的产品损坏或连带事故发生，本公司不承担相关责任。当客户在使用产品时，应根据最新版本文件上规定的操作步骤或说明条件进行使用或测试。客户有责任遵从安全规则（包括冗余设计、防火措施、故障预防等）设计安全及稳定的系统环境，在实际应用前、或实际应用中验证本文件所述的任何功能，以确保适用性、安全性（预防可能发生的任何事故、火灾或社会伤害等）及可靠性。建议客户在测试前可咨询本公司，以验证产品信息是否可以涵盖应用需求。

- This product shall not be used in any equipment or applications requiring higher reliability or quality standards where failure could result in personal injury, death, or catastrophic events, including but not limited to nuclear control systems, aircraft/aviation components, maritime/rail transport equipment, traffic signaling devices, combustion control systems, medical equipment, or other safety-critical applications. Customers must procure genuine products exclusively through the Company or authorized channels, and utilize them strictly within legally permitted boundaries and under conditions expressly defined in this specification. The Company disclaims all liability for losses, damages, or injuries arising from non-compliance with these requirements.

本产品不能且禁止应用在一些需要更高稳定性及质量的特殊设备上，以免导致人员伤亡等意外发生，包括原子能控制设备，飞机及航空器件，船舶、轨道等运输设备，交通信号设备，燃烧控制设备，医药设备以及所有安全性设备等。客户应通过本公司或经本公司授权的渠道购买正品，并应在法律约束范围内及本文件明确条件下合法、合理使用，否则造成损失与伤害的，本公司概不负责。

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- This specification is written in both Chinese and English, and in case of any conflict between the Chinese and English versions, the Chinese version shall prevail.

本文件以中英文双语书就，如有不同之处，以中文内容为准。