

BMSE013TN4D

40V, 1.3 mohm N-channel standard level MOSFET

40V, 1.3 毫欧标准 N-沟道金属氧化物半导体场效应晶体管

Features

特性

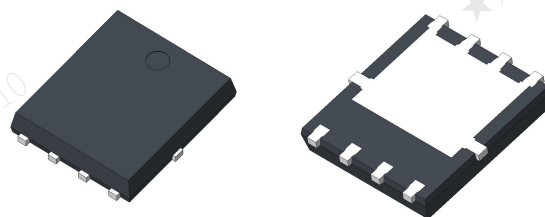
- High Speed Smooth Switching
开关速度快
- Excellent $Q_g \times R_{DS(on)}$ (FOM)
优异的品质因数
- Very Low On-Resistance $R_{DS(on)}$
低导通电阻
- 100% Avalanche Tested
100%通过雪崩测试
- Maximum Junction Temperature of 175°C
最高结温175°C
- AEC-Q101 Qualified
符合 AEC-Q101 标准

Applications

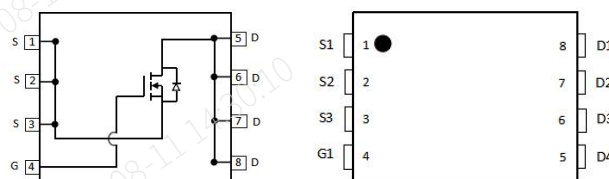
应用

- Powertrain Management
动力总成管理
- Solenoid and Motor Drivers
电磁阀和电机驱动器
- Electronic Steering
电子转向

Simplified Outline



Graphic Symbol



Part Number 型号	$V_{DS}[V]$ 漏极-源极电压	$R_{DS(on) max}[m\Omega]$ 导通电阻	$I_D[A]$ 漏极电流	Marking 标记	Package 封装
BMSE013TN4D	40	1.3	200	013TN4D	PDFN5x6-8L

BMSE013TN4D

Maximum Rated Values

最大额定值

Parameter 参数	Symbol 符号	Conditions 条件	Value 值	Unit 单位
Drain-Source Voltage 漏极-源极电压	V_{DS}	$T_C=25^{\circ}\text{C}$	40	V
Gate-Source Voltage 栅极-源极电压	V_{GS}	$T_C=25^{\circ}\text{C}$	± 20	
Drain Current 漏极电流	I_D	$T_C=25^{\circ}\text{C}$	200	A
Drain Current 漏极电流	I_D	$T_C=100^{\circ}\text{C}$	140	
Pulsed Drain Current 漏极脉冲电流	$I_{D,pulse}$	t_p limited by T_{jmax}	630	
Single Pulse Avalanche Energy 单脉冲雪崩能量	E_{AS}	$V_{GS}=10\text{V},$ $V_{DD}=40\text{V},$ $R_G=25\Omega,$ $L=0.5\text{mH},$ $T_C=25^{\circ}\text{C}$	900	mJ
Power Dissipation 常温耗散功率	P_D	$T_C=25^{\circ}\text{C}$	60	W
Maximum Junction Temperature 最高结温	$T_{j,max}$		175	$^{\circ}\text{C}$
Operating Junction Temperature 工作结温	T_J		$-55\dots+175$	
Storage Temperature 储存温度	T_{STG}		$-55\dots+175$	

Thermal Resistance

热阻

Parameter 参数	Symbol 符号	Max. 最大值	Unit 单位
Thermal Resistance, Junction to Case 结-管壳热阻	$R_{th(j-c)}$	2.5	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient, 1inch ² 2oz copper plate FR4 结-环境热阻, 1 平方英寸 2 盎司铜箔 FR4	$R_{th(j-a)}$	50.2	$^{\circ}\text{C}/\text{W}$

BMSE013TN4D

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

电学特性 ($T_J = 25^\circ\text{C}$, 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 Characteristics

静态特性

Drain-Source Breakdown Voltage 漏极-源极击穿电压	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current 栅源短路的漏极电流	I_{DSS}	$V_{DS}=40V,$ $V_{GS}=0V$	$T_J=25^\circ\text{C}$	-	-	1
			$T_J=125^\circ\text{C}$	-	-	100
Gate-Source Leakage Current 栅-源漏泄电流	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Drain-Source On-State Resistance 漏-源通态电阻	$R_{DS(on)}$	$V_{GS}=10V, I_D=25A$	-	0.8	1.3	m Ω
Gate Threshold Voltage 栅-源阈值电压	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.8	4.0	V

Dynamic Characteristics

动态特性

Input Capacitance 输入电容	C_{iss}	$V_{GS}=0V,$ $V_{DS}=20V,$ $f=1\text{MHz}$	-	8303	-	pF
Output Capacitance 输出电容	C_{oss}		-	1844	-	
Reverse Transfer Capacitance 反向传输电容	C_{rss}		-	85	-	
Gate Resistance 栅极电阻	R_g	$f=1\text{MHz}$	-	3.0	-	Ω
Total Gate Charge 栅极总电荷	$Q_{g(tot)}$	$V_{DS}=32V,$ $I_D=25A,$ $V_{GS}=10V$	-	87.6	-	nC
Gate-Source Charge 栅极-源级电荷	Q_{gs}		-	23.4	-	
Gate-Drain Charge 栅极-漏极电荷	Q_{gd}		-	9.5	-	

BMSE013TN4D

Switching Characteristics ($T_J = 25^\circ\text{C}$)

开关特性 ($T_J = 25^\circ\text{C}$)

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	

MOSFET Characteristics

MOSFET 特性

Turn-On Delay Time 开通延迟时间	$t_{d(on)}$	$V_{DS}=20V,$ $I_D=25A,$ $V_{GS}=10V,$ $R_G=10\Omega$	-	79	-	ns
Rise Time 上升时间	t_r		-	162	-	
Turn-Off Delay Time 关断延迟时间	$t_{d(off)}$		-	26	-	
Fall Time 下降时间	t_f		-	78	-	

Source-Drain Diode Characteristics

源极-漏极二极管特性

Forward Voltage 正向电压	V_{SD}	$V_{GS}=0V,$ $I_S=25A$	-	0.8	1.2	V
Reverse Recovery Time 反向恢复时间	t_{rr}	$V_{GS}=0V,$ $I_S=25A,$	-	58	-	ns
Reverse Recovery Charge 反向恢复电荷	Q_{rr}	$V_{DS}=20V,$ $di/dt=100A/\mu s$	-	70	-	nC

BMSE013TN4D

Characteristics Diagrams

特性曲线

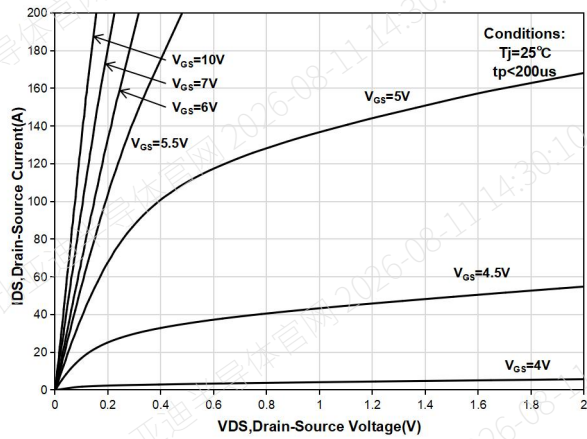


Figure 1. Typical Output Characteristics($T_j=25^\circ\text{C}$)

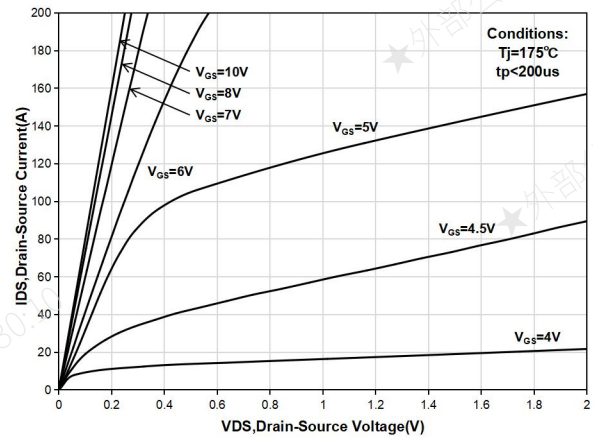


Figure 2. Typical Output Characteristics($T_j=175^\circ\text{C}$)

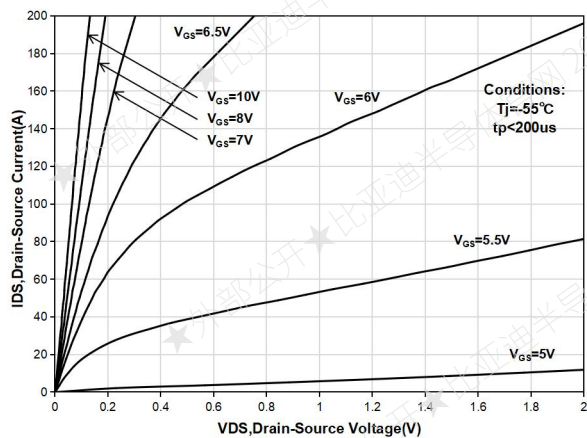


Figure 3. Typical Output Characteristics($T_j=-55^\circ\text{C}$)

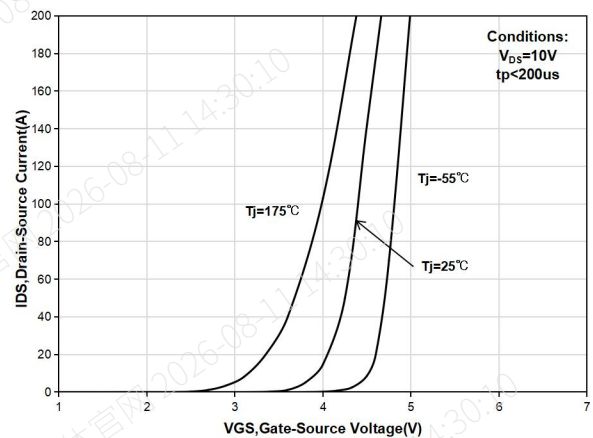


Figure 4. Typical Transfer Characteristics

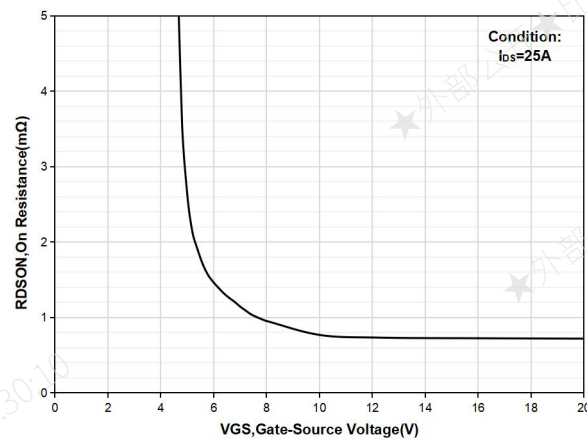


Figure 5. Typical On-Resistance vs. Gate-Source Voltage

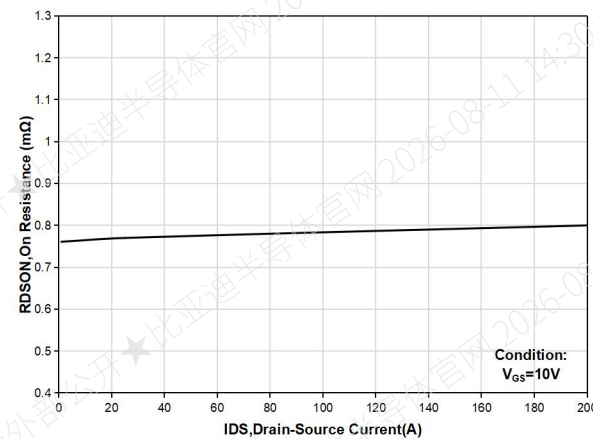


Figure 6. Typical On-Resistance vs. Drain-Source Current

BMSE013TN4D

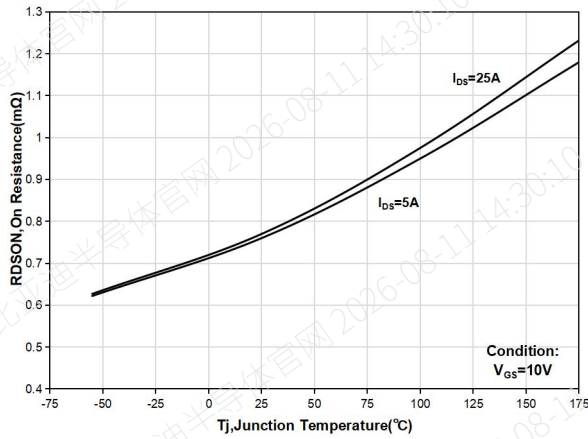


Figure 7. Typical On-Resistance vs. Junction Temperature

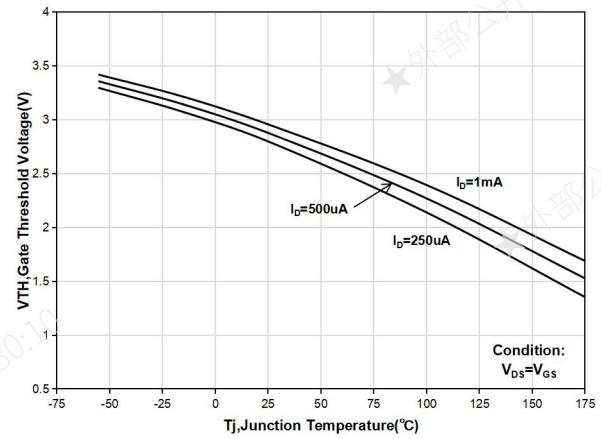


Figure 8. Typical Gate Threshold Voltage vs. Junction Temperature

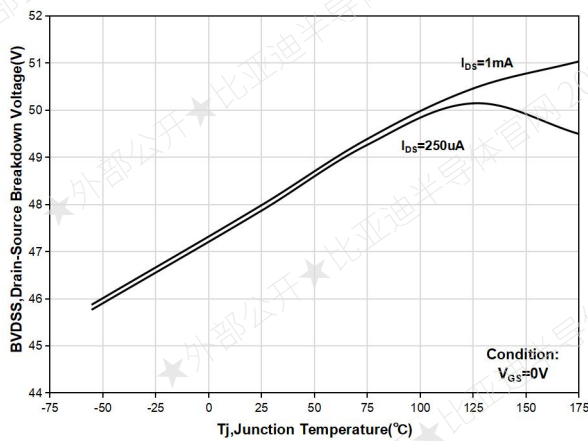


Figure 9. Typical Drain-Source Breakdown Voltage vs. Junction Temperature

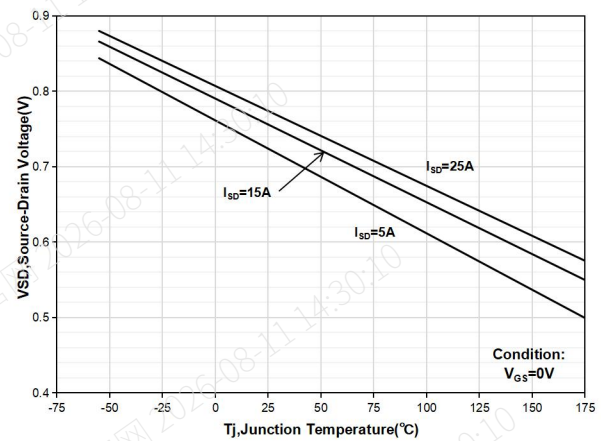


Figure 10. Typical Source-Drain Diode Forward Voltage vs. Junction Temperature

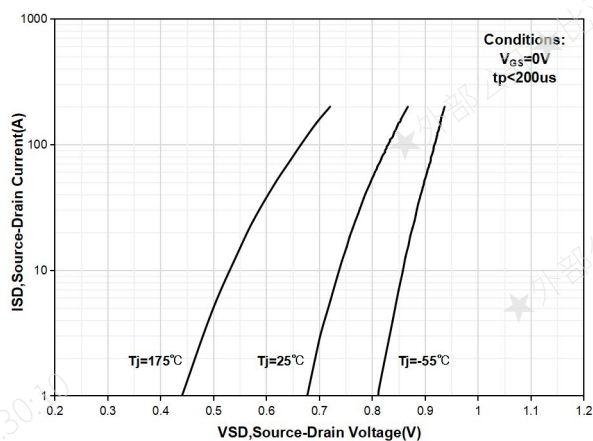


Figure 11. Typical Source-Drain Diode Forward Characteristics

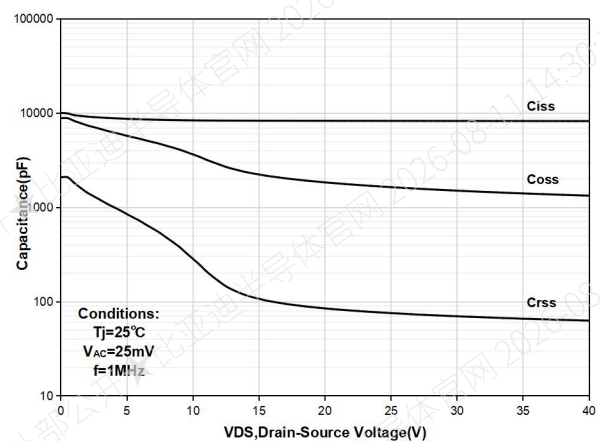


Figure 12. Typical Capacitance Characteristics

BMSE013TN4D

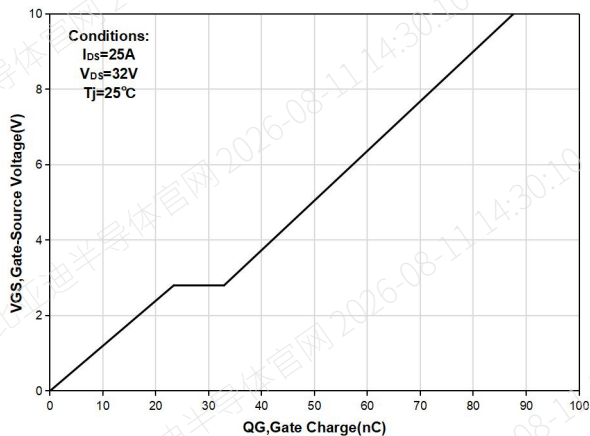


Figure 13. Typical Gate Charge Characteristics

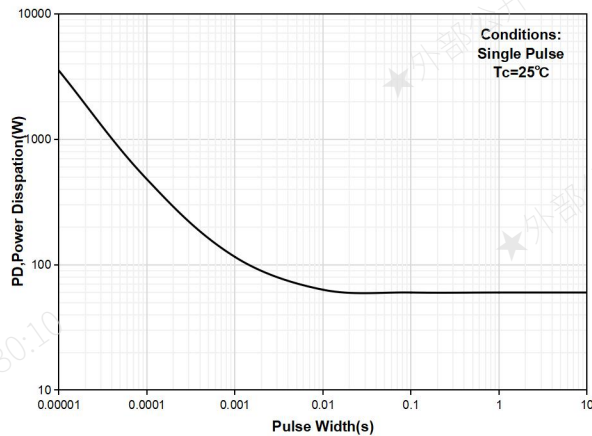


Figure 14. Maximum Single Pulse Power Dissipation

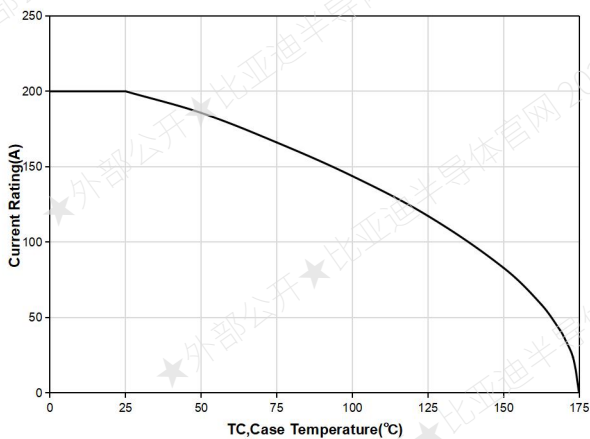


Figure 15. Maximum Current Derating

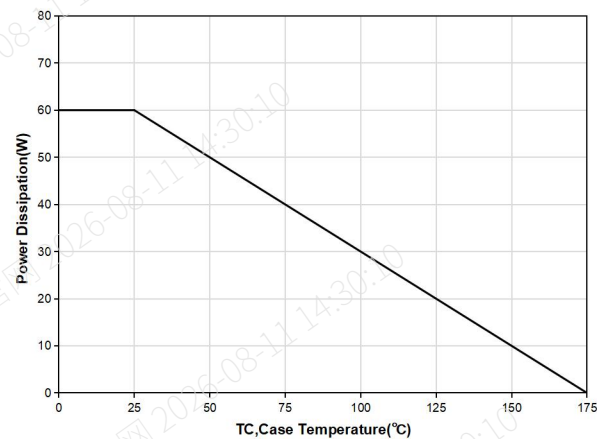


Figure 16. Maximum Power Derating

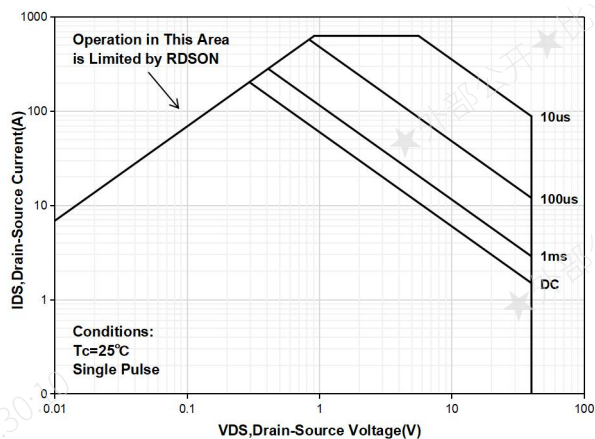


Figure 17. Forward Biased Safe Operating Area

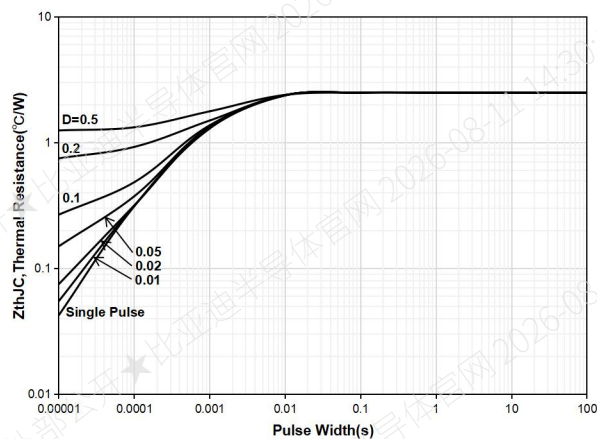


Figure 18. Maximum Transient Thermal Impedance

BMSE013TN4D

Test Circuits & Waveforms

测试电路与波形

Switching Time

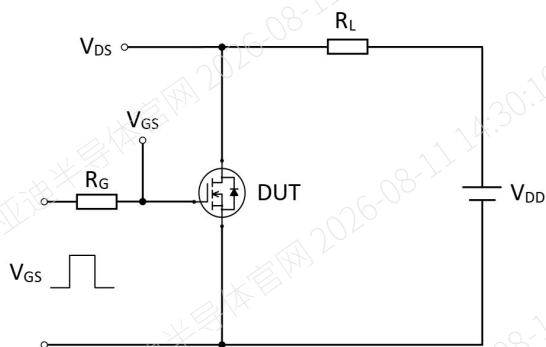


Figure 1. Switching Time Test Circuit

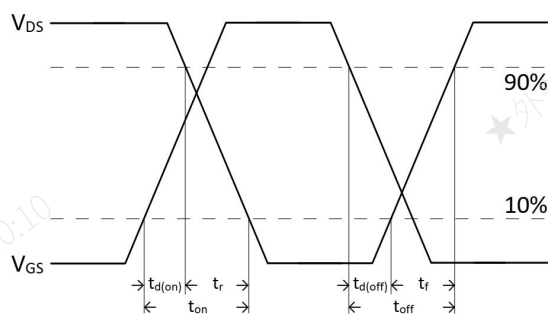


Figure 2. Switching Time Waveform

Source-Drain Diode Recovery

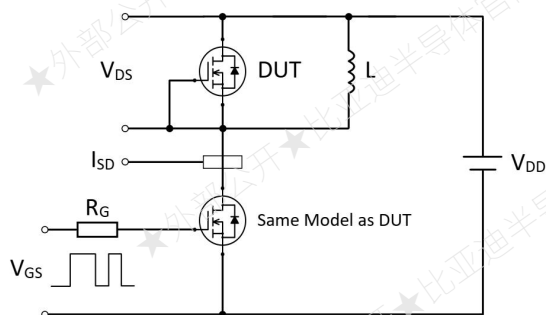


Figure 3. Source-Drain Diode Recovery Test Circuit

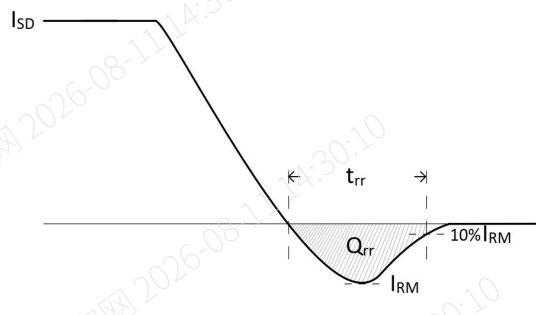


Figure 4. Source-Drain Diode Recovery Waveform

Unclamped Inductive Load

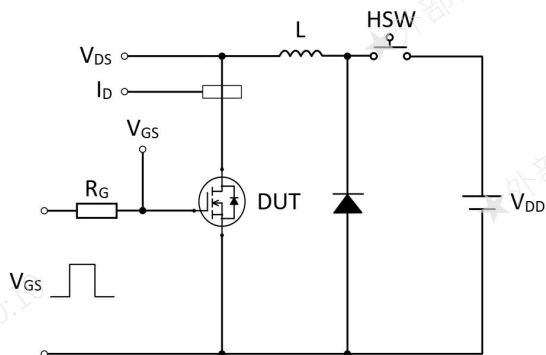


Figure 5. Unclamped Inductive Load Test Circuit

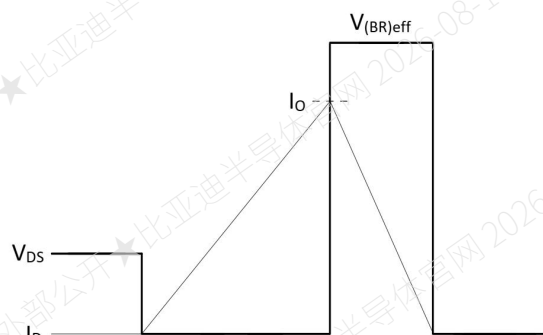
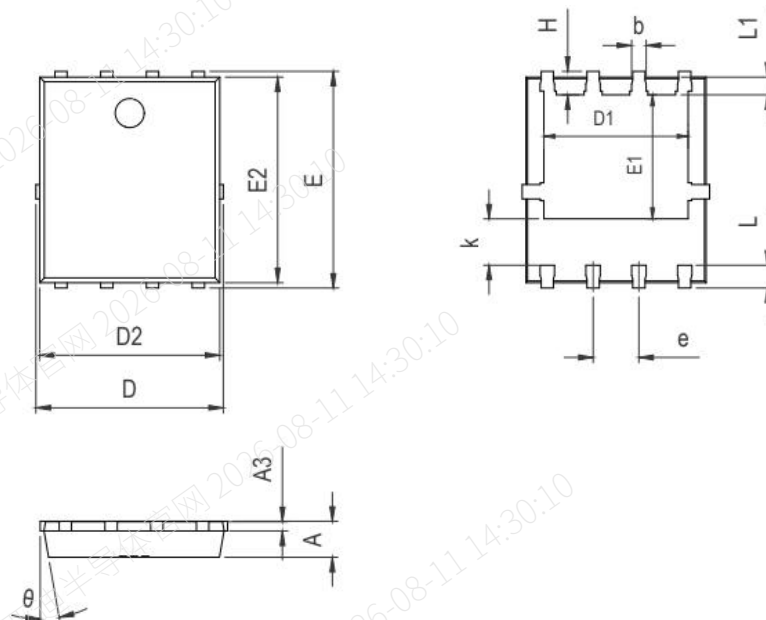


Figure 6. Unclamped Inductive Load Waveform

BMSE013TN4D

PDFN5x6-8L Outline Dimensions

PDFN5x6-8L 外形尺寸



Symbol	Common Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF		0.010REF	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP		0.050TYP	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

Packing

包装

Packing 包装	pcs/reel 个/卷	reel/inner box 卷盘/内盒	inner box/carton 内盒/箱	pcs/carton 个/箱
Reel 卷盘	5000	2	5	50000

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BMSE013TN4D

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