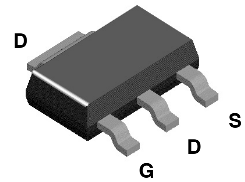
MOSFET – N 沟道, POWERTRENCH®

100 V, 5.6 A, 160 mΩ

FDT1600N10ALZ

DATA SHEET
www.onsemi.cn



SOT–223
CASE 318H

说明

此 N 沟道 MOSFET 采用 **onsemi** 先进的 POWERTRENCH 工艺生产，这一先进工艺专用于最小化通态电阻，同时保持卓越的开关性能。

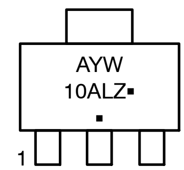
特性

- $R_{DS(on)}$ = 121 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 2.8 A
- $R_{DS(on)}$ = 156 mΩ (Typ.) @ V_{GS} = 5 V, I_D = 1.8 A
- 低栅极电荷 (典型值 2.9 nC)
- 低 Crss (典型值 2.04 pF)
- 开关速度快
- 100% 经过雪崩测试
- dv/dt 能力改进
- 符合 RoHS 标准

应用

- 消费电子设备
- LED 电视和显示器
- 同步整流
- 不间断电源
- 微型太阳能逆变器

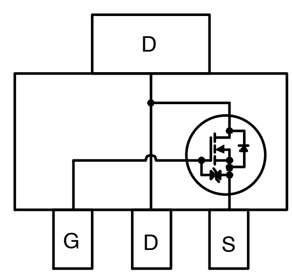
MARKING DIAGRAM



A	= Assembly Location
Y	= Year
W	= Work Week
10ALZ	= Specific Device Code
▪	= Pb−Free Package

(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

September, 2023 − Rev. 4
Publication Order Number:
FDT1600N10ALZCN/D

MOSFET 最大额定值 (T_C = 25°C 除非另有说明)

符号	参数			FDT1600N10ALZ	单位
V_{DSS}	漏极一源极电压			100	V
V_{GSS}	栅极一源极电压			±20	V
I_D	漏极电流	– 连续 (T_C = 25°C)		5.6	A
		– 连续 (T_C = 100°C)		3.5	
I_{DM}	漏极电流	– 脉冲	(注 2)	11.2	A
E_{AS}	单脉冲雪崩能量		(注 3)	9.2	mJ
dv/dt	二极管恢复 dv/dt 峰值		(注 4)	6.0	V/ns
P_D	功耗	(T_C = 25°C)		10.42	W
		– 超过 25°C 时降额		0.083	W/°C
T_J, T_{STG}	工作和存储结温范围			–55 to +175	°C
T_L	用于引脚焊接的最大温度，距离外壳 1/8"，持续 5 秒			300	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
(参考译文)
如果电压超过最大额定值表中列出的值范围，器件可能会损坏。如果超过任何这些限值，将无法保证器件功能，可能会导致器件损坏，影响可靠性。

热性能

符号	参数		FDT1600N10ALZ	单位
$R_{\theta JC}$	结至外壳热阻最大值	(注 1)	12	°C/W
$R_{\theta JA}$	结至环境热阻最大值	(注 1a)	60	

电气特性 (T_C = 25°C 除非另有说明)

符号	参数	测试条件	最小值	典型值	最大值	单位
关断特性						
BV_{DSS}	漏极一源极击穿电压	I_D = 250 μA, V_{GS} = 0 V	100	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	击穿电压温度系数	I_D = 250 μA, 温度参考 25°C	–	0.1	–	V/°C
I_{DSS}	零栅极电压漏极电流	V_{DS} = 80 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 80 V, V_{GS} = 0 V, T_C = 125°C	–	–	500	
I_{GSS}	栅极一源极漏电流	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	±10	μA
导通特性						
$V_{GS(th)}$	栅极阈值电压	V_{GS} = V_{DS}, I_D = 250 μA	1.4	–	2.8	V
$R_{DS(on)}$	漏极至源极静态导通电阻	V_{GS} = 10 V, I_D = 2.8 A	–	121	160	mΩ
		V_{GS} = 5 V, I_D = 1.8 A	–	156	375	
g_{FS}	正向跨导	V_{DS} = 10 V, I_D = 5.6 A	–	26.1	–	S
动态特性						
C_{iss}	输入电容	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz	–	169	225	pF
C_{oss}	输出电容		–	43	55	pF
C_{rss}	反向传输电容		–	2.04	–	pF
$C_{oss(er)}$	能源相关输出电容	V_{DS} = 50 V, V_{GS} = 0 V	–	85	–	pF

电气特性 (T_C = 25°C 除非另有说明)

符号	参数	测试条件		最小值	典型值	最大值	单位
$Q_{g(tot)}$	10 V 的栅极电荷总量	V_{GS} = 10 V	V_{DD} = 50 V, I_D = 5.6 A (注 5)	–	2.9	3.77	nC
$Q_{g(tot)}$	5 V 的栅极电荷总量	V_{GS} = 5 V		–	1.6	2.08	nC
Q_{gs}	栅极一源极栅极电荷			–	0.7	–	nC
Q_{gd}	栅极一漏极 “密勒” 电荷			–	0.64	–	nC
$V_{plateau}$	栅极电场电压			–	3.81	–	V
Q_{sync}	总栅极电荷同步	V_{DS} = 0 V, I_D = 2.8 A		–	2.45	–	nC
Q_{oss}	输出电荷	V_{DS} = 50 V, V_{GS} = 0 V		–	5.2	–	nC
ESR	等效串联电阻 (G–S)	f = 1 MHz		–	2.1	–	Ω

开关特性

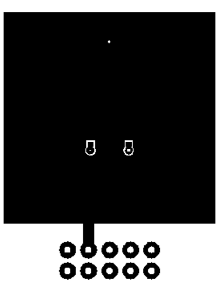
符号	参数	测试条件	最小值	典型值	最大值	单位
$t_{d(on)}$	导通延迟时间	V_{DD} = 50 V, I_D = 5.6 A, V_{GS} = 10 V, R_G = 4.7 Ω (注 5)	–	7.4	24.8	ns
t_r	上升时间		–	2.5	15	ns
$t_{d(off)}$	关断延迟时间		–	13.5	37	ns
t_f	关断下降时间		–	2.4	14.8	ns

漏极一源极二极管特性

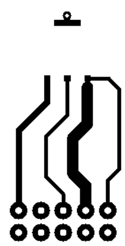
符号	参数	测试条件	最小值	典型值	最大值	单位
I_S	漏极一源极二极管最大连续正向电流		–	–	5.6	A
I_{SM}	漏极一源极二极管最大正向脉冲电流		–	–	11.2	A
V_{SD}	源极一漏极二极管正向电压	V_{GS} = 0 V, I_S = 5.6 A	–	–	1.3	V
t_{rr}	反向恢复时间	V_{GS} = 0 V, I_{SD} = 5.6 A, V_{DD} = 50 V, dI_F/dt = 100 A/μs	–	34.1	–	ns
Q_{rr}	反向恢复电荷		–	32.7	–	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
(参考译文)
除非另有说明，“电气特性”表格中列出的是所列测试条件下的产品性能参数。如果在不同条件下运行，产品性能可能与“电气特性”表格中所列性能参数不一致。

1. $R_{\theta JA}$ 等于结至壳体和壳体至环境热阻之和，其中，壳体热参考定义为漏极引脚的焊料安装表面。
   $R_{\theta JC}$ 由设计保证，而 $R_{\theta CA}$ 由用户的板设计确定。



a. 60 安装在 2 oz 的最小 1 in^2 铜焊盘上时的 ° C/W。



b. 118 安装在 2 oz 的最小铜焊盘上时的 ° C/W。

2. 重复额定值：脉冲宽度受限于最大结温。
3. 启动 T_J = 25°C, L = 3 mH, I_{AS} = 2.47 A。
4. I_{SD} ≤ 5.6 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, 启动 T_J = 25°C
5. 本质上独立于工作温度的典型特性。

封装标识与定购信息

器件编号	顶标	封装形式	卷盘尺寸	载带宽	数量 / 包装方法†
FDT1600N10ALZ	10ALZ	SOT–223	13”	12 mm	4000 颗/卷

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

典型性能特征

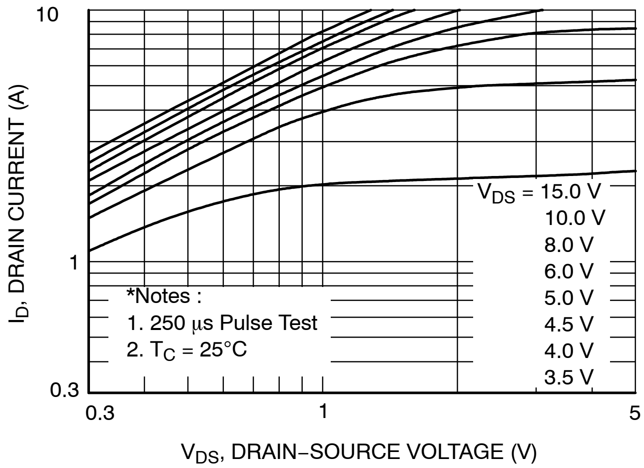


图 1. 导通区域特性

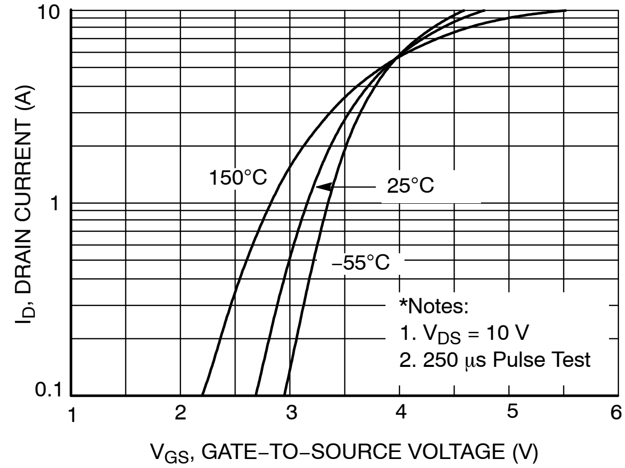


图 2. 传输特性

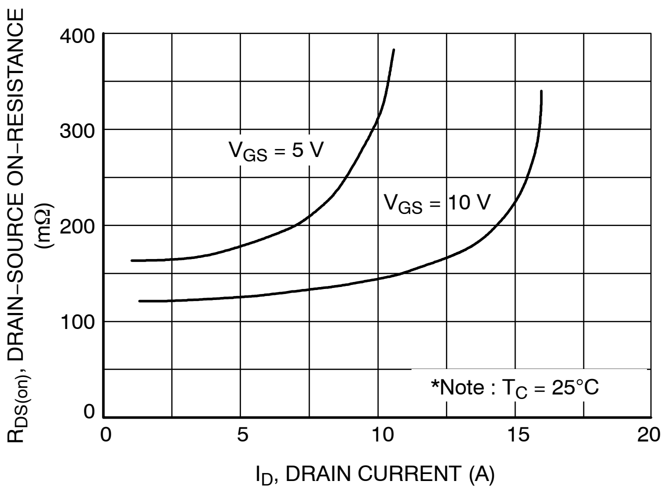


图 3. 导通电阻变化与漏极电流和栅极电压

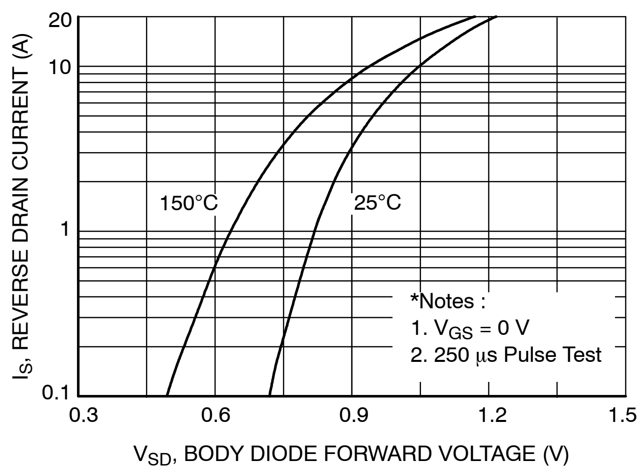


图 4. 体二极管正向电压变化与源电流和温度

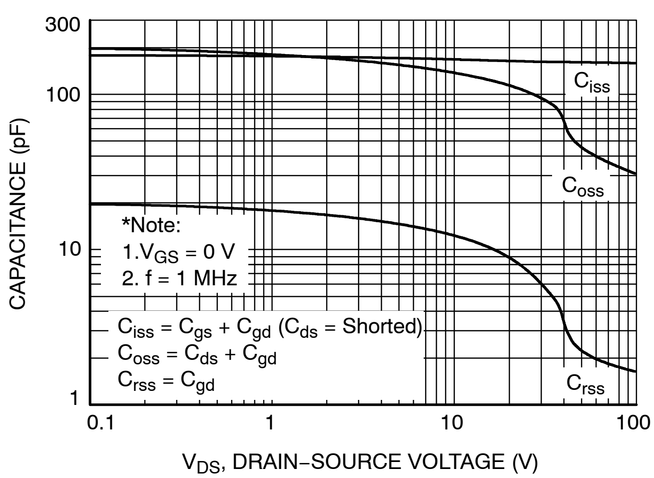


图 5. 电容特性

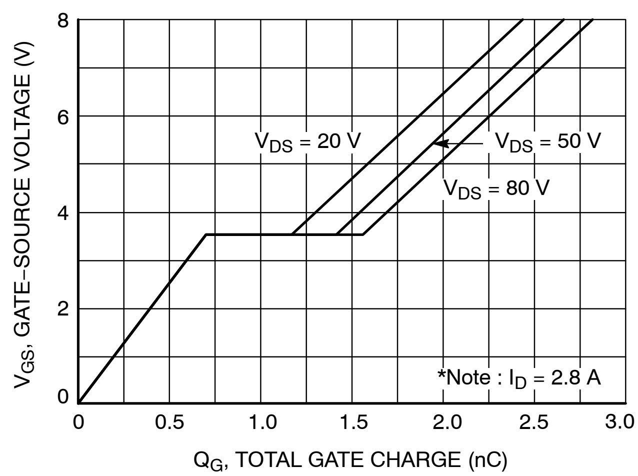


图 6. 栅极电荷

典型性能特征（接上页）

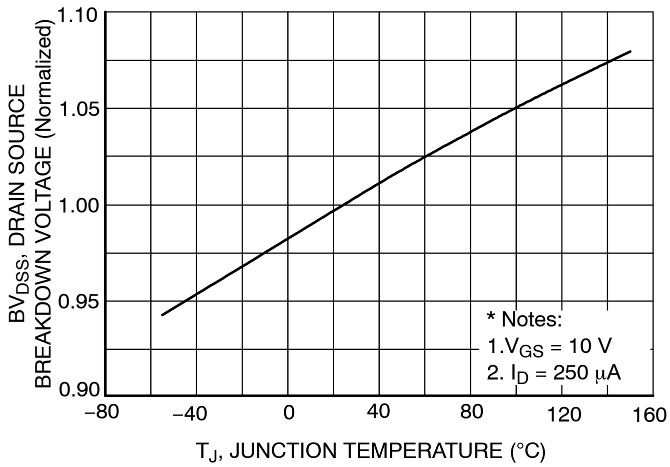


图 7. 击穿电压变化与温度

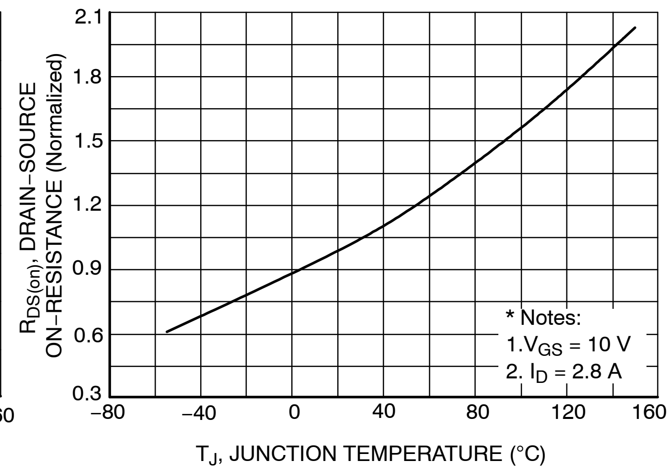


图 8. 导通电阻变化与温度

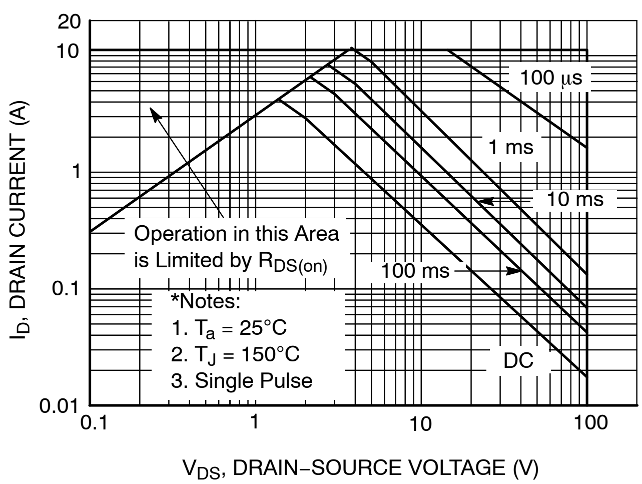


图 9. 最大安全工作区

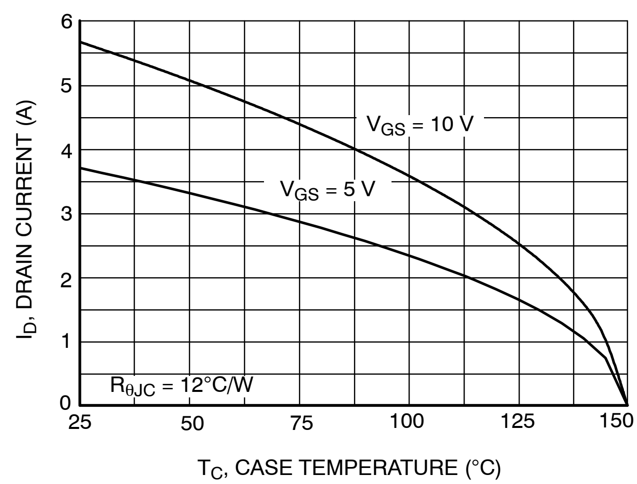


图 10. 最大漏极电流与壳体温度

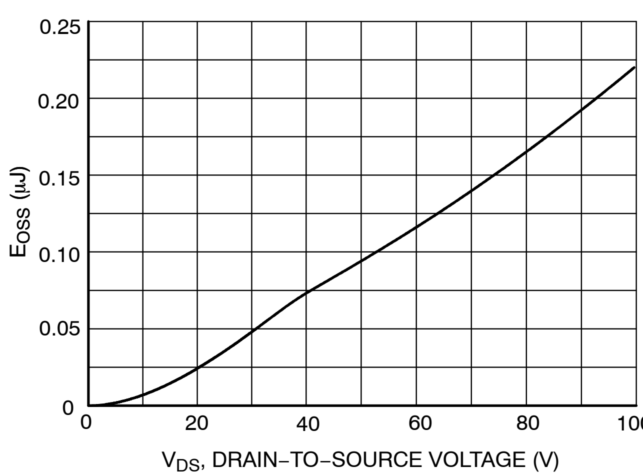


图 11. **Eoss** 与漏极至源极电压

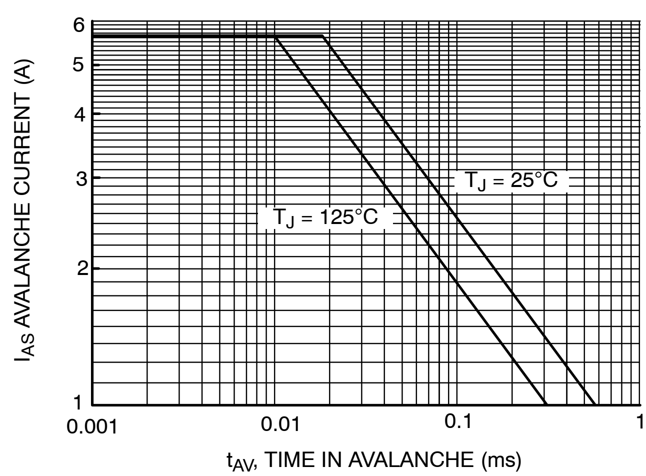


图 12. 非箝位感性开关能力

典型性能特征（接上页）

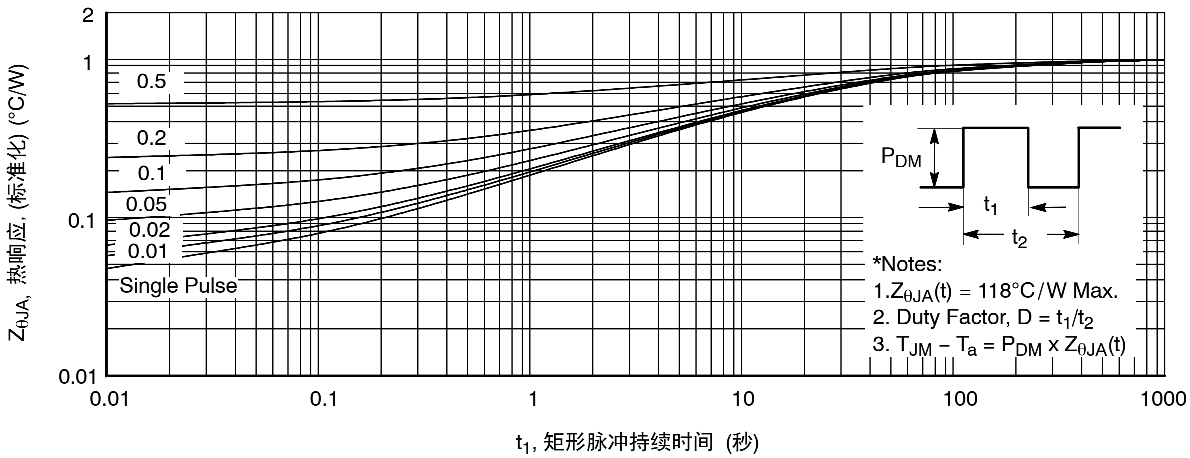


图 13. 瞬态热响应曲线

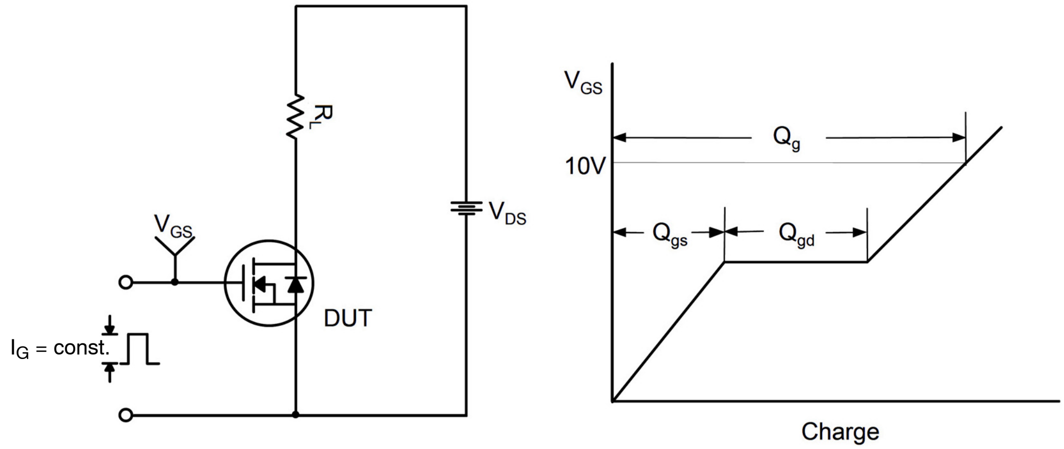


图 14. 栅极电荷测试电路与波形

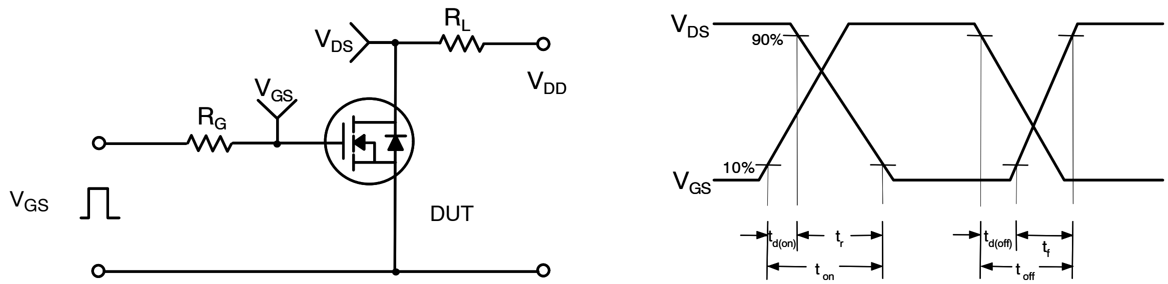


图 15. 阻性开关测试电路与波形

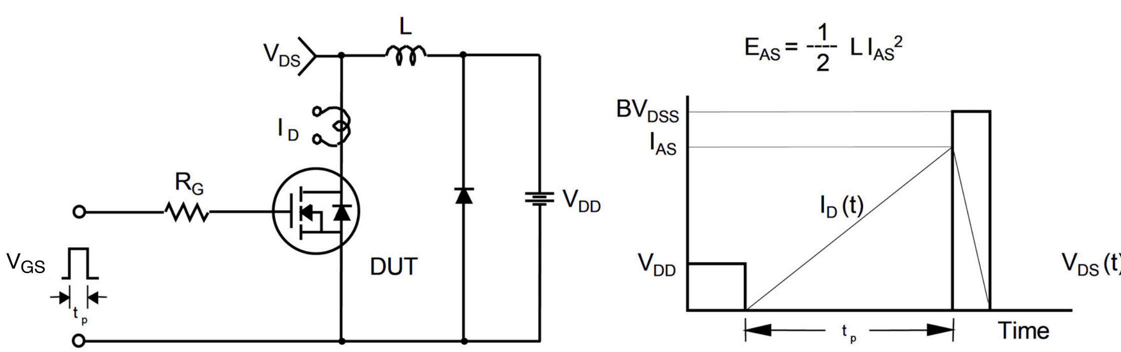


图 16. 非箝位感性开关测试电路与波形

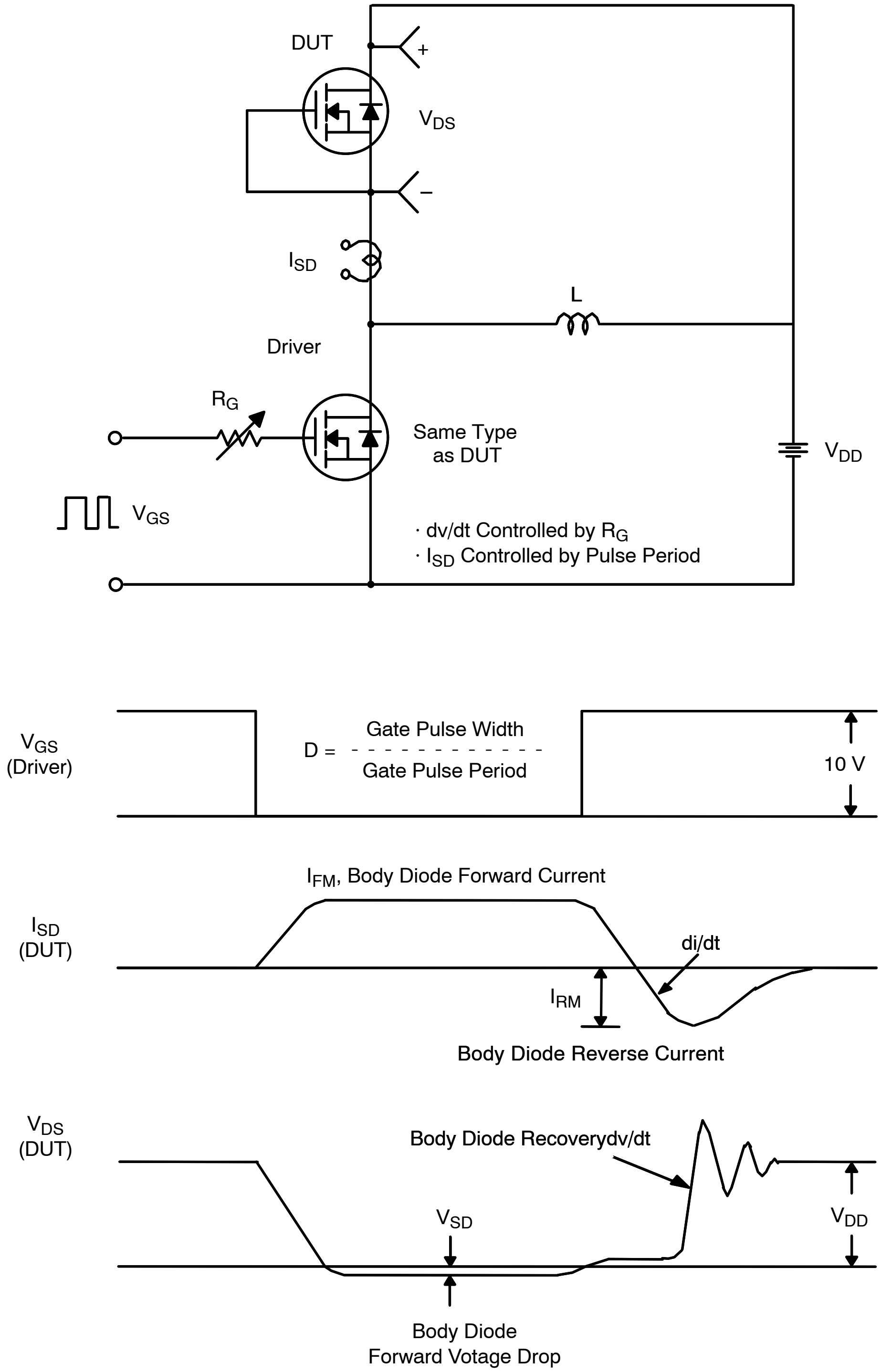
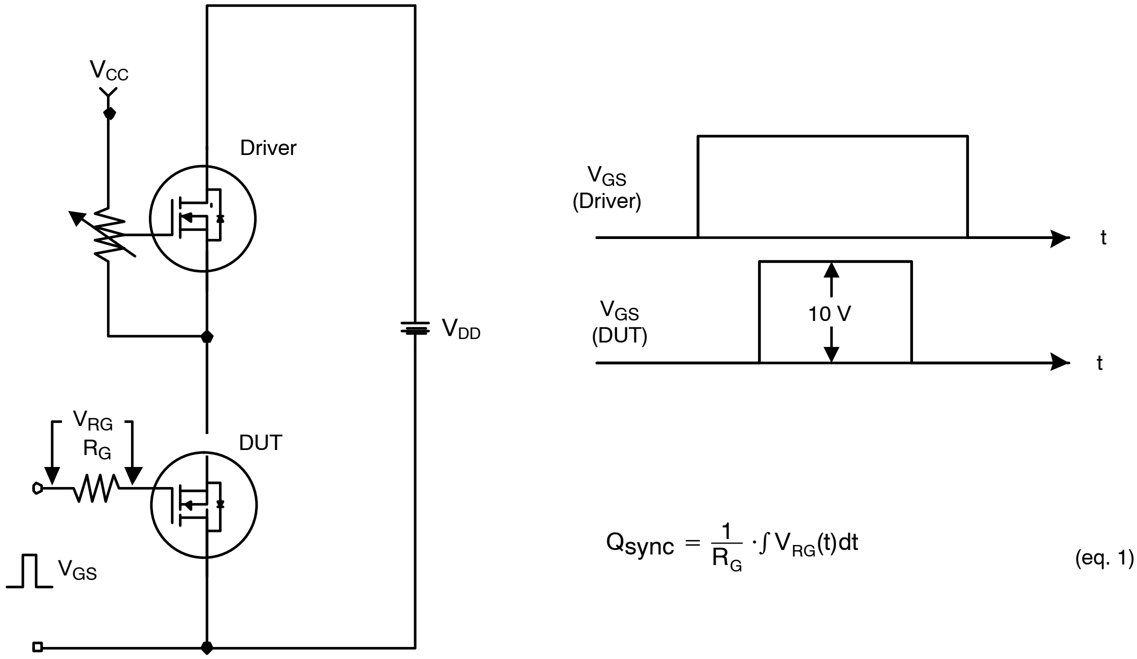


图 17. 二极管恢复 **dv/dt** 峰值测试电路与波形



$$Q_{sync} = \frac{1}{R_G} \cdot \int V_{RG}(t)dt \qquad \text{(eq. 1)}$$

图 18. 总栅极电荷 **Qsync.** 测试电路和波形

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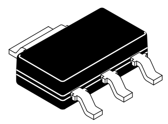
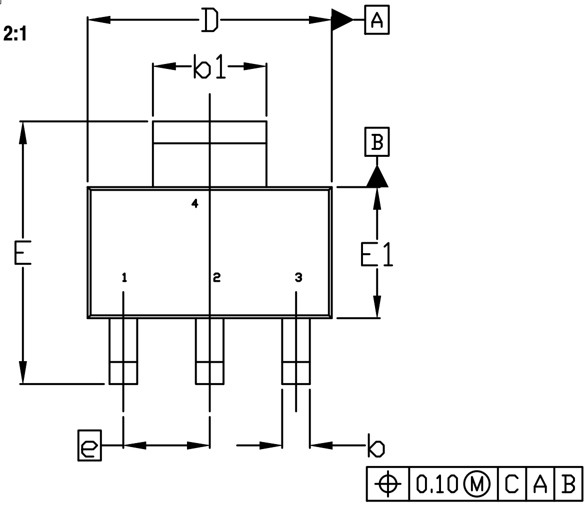


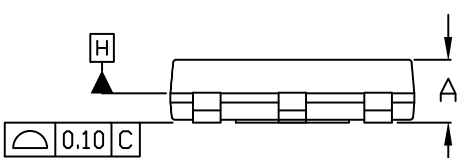
SCALE 2:1

SOT−223
CASE 318H
ISSUE B

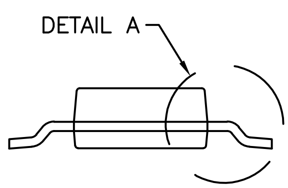
DATE 13 MAY 2020



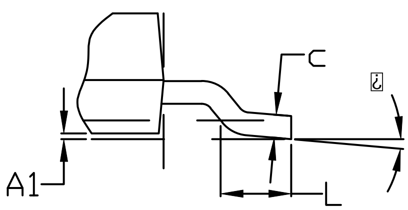
TOP VIEW



SIDE VIEW



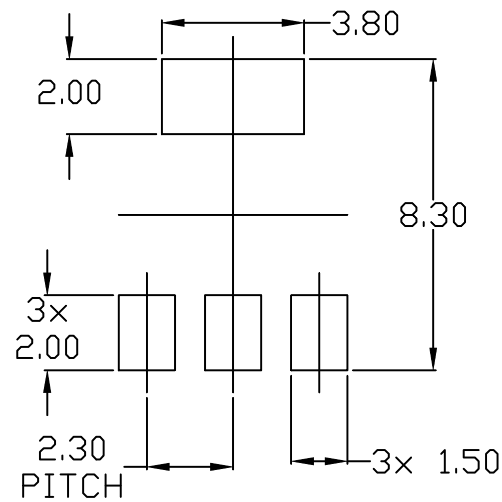
END VIEW



DETAIL A

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
4. LEAD DIMENSIONS b AND b1 DO NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBBAR PROTRUSION IS 0.08mm PER SIDE.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
7. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

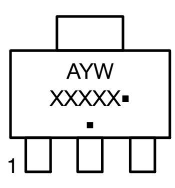
	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	---	---	1.80
A1	0.02	0.06	0.11
b	0.60	0.74	0.88
b1	2.90	3.00	3.10
c	0.24	---	0.35
D	6.30	6.50	6.70
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.30 BSC		
L	0.25	---	---
¿	0°	---	10°



RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



A = Assembly Location
Y = Year
W = Work Week
XXXXX = Specific Device Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**SOT−223**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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