DG2N65

N 沟道增强型场效应晶体管
N-CHANNEL ENHANCEMENT MODE MOSFET

版本号 201603-A

产品概述 General Description

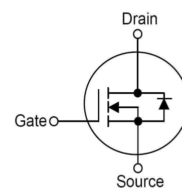
DG2N65是N沟道增强型场效应晶体管，应用了东晨电子的相关技术，采用自对准平面工艺及先进的终端耐压技术，降低了导通损耗，提高了开关特性，增强了雪崩耐量。该产品能应用于多种功率开关电路，使得电源能效更高，系统更加小型化。

DG2N65 is an N-channel enhancement mode MOSFET, which is produced using Dongchen Electronics’s proprietary. The self-aligned planar process and improved terminal technology reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for higher efficiency and system miniaturization.

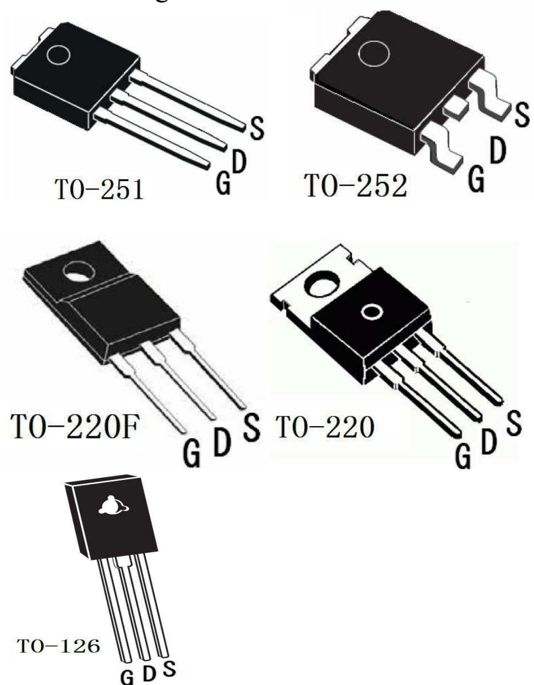
主要参数 MAIN CHARACTERISTICS

V_{DSS}	650	V
I_D	2	A
$R_{DS(ON)}$	3.7	Ω
Crss	6.0	pF

符号 Symbol



封装 Package



产品特性 FETURES

- 低Crss / Low Crss
- 低栅极电荷 / Low gate charge
- 开关速度快 / Fast switching
- 高抗ESD能力 / Improved ESD capability
- 高抗dv/dt能力 / Improved dv/dt capability
- 100%雪崩测试 / 100% avalanche energy test

应用领域 APPLICATIONS

- 高频开关电源 / High efficiency swith mode power supplies
- 电子镇流器 / Electronic lamp ballasts
- UPS电源 / UPS

绝对最大额定值 ABSOLUTE MAXIMUM RATINGS (Tc=25℃)

参数名称 Parameter	符号 Symbol		数值 Value	单位 Unit
漏极-源极直流电压 Drain-Source Voltage	V_{DSS}		650	V
连续漏极电流 Continues Drain Current	I_D	Tc=25℃	2*	A
		Tc=100℃	1.3*	
最大脉冲漏极电流 (注 1) Plused Drain Current (note 1)	I_{DM}		8	A
最高栅源电压 Gate-to-Source Voltage	V_{GS}		±30	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E_{AS}		120	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I_{AR}		2.0	A
重复雪崩能量 (注 1) Repetitive Avalanche Energy (note 1)	E_{AR}		10	mJ
二极管反向恢复最大电压变化速率 (注 3) Peak Diode Recovery (note 3)	dv/dt		4.5	V/ns
耗散功率 Power Dissipation	P_D Tc=25℃	TO-251/TO-252	44	W
		TO-220	54	
		TO-220F	23	
		TO-126	39	
耗散功率减额因子 Power Dissipation Derating Factor	$P_{D(DF)}$ Above 25℃	TO-251/TO-252	0.39	W/℃
		TO-220	0.8	
		TO-220F	0.26	
		TO-126	0.31	
最高结温及存储温度 Operating and Storage Temperature Range	T_J，T_{STG}		150，-55～+150	℃
引线最高焊接温度 Maximum Temperature for Soldering	T_L		300	℃

热特性 THERMAL CHARACTERIASTIC

参数名称 Parameter	符号 Symbol		最大 Max	单位 Unit
结到管壳的热阻 Thermal Resistance，Junction to Case	Rth(j-c)	TO-251/TO-252	2.87	℃/W
		TO-220	2.32	
		TO-220F	5.5	
		TO-126	3.2	
结到环境的热阻 Thermal Resistance，Junction to Ambient	Rth(j-A)	TO-251/TO-252	110	℃/W
		TO-220	62.5	
		TO-220F	62.5	
		TO-126	89	

* 漏极电流由最高结温限制 Drain current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

关断特性 Off-Characteristics

参数名称 Parameter	符号 Symbol	测试条件 Tests Conditions	最小 Min	典型 Type	最大 Max	单位 Unit
漏极-源极击穿电压 Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	650	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	△BV_{DSS}/△T_J	I_D=250μA, referenced to 25℃	-	0.7	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V, T_C=25℃	-	-	1	μA
		V_{DS}=520V, T_C=125℃	-	-	10	
正向栅极体漏电流 Gate-body leakage current, forward	I_{GSSF}	V_{DS}=0V, V_{GS}=30V	-	-	100	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I_{GSSR}	V_{DS}=0V, V_{GS}=-30V	-	-	-100	nA

通态特性 On-Characteristics

参数名称 Parameter	符号 Symbol	测试条件 Tests Conditions	最小 Min	典型 Type	最大 Max	单位 Unit
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=1.0A	-	3.7	4.7	Ω
正向跨导 Forward Transconductance	g_{fs}	V_{DS}=40V, I_D=1.0A (note4)	-	2.0	-	S

动态特性 Dynamic Characteristics

参数名称 Parameter	符号 Symbol	测试条件 Tests Conditions	最小 Min	典型 Type	最大 Max	单位 Unit
输入电容 Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHZ	-	380	480	pF
输出电容 Output capacitance	C_{oss}		-	40	52	pF
反向传输电容 Reverse transfer capacitance	C_{rss}		-	6.0	8.0	pF

开关特性 Switching Characteristics

参数名称 Parameter	符号 Symbol	测试条件 Tests Conditions	最小 Min	典型 Type	最大 Max	单位 Unit
延迟时间Turn-On delay time	$t_d(on)$	V_{DD}=325V, I_D=2A, R_G=25Ω (note 4，5)	-	16	40	ns
上升时间Turn-On rise time	t_r		-	50	110	ns
延迟时间Turn-Off delay time	$t_d(off)$		-	40	80	ns
下降时间Turn-Off Fall time	t_f		-	45	95	ns
栅极电荷总量Total Gate Charge	Qg	V_{DS}=520V , I_D=2A, V_{GS}=10V (note 4，5)	-	10	14	nC
栅一源电荷Gate-Source charge	Qgs		-	2.1	-	nC
栅一漏电荷Gate-Drain charge	Qgd		-	5.5	-	nC

漏-源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
参数名称 Parameter	符号 Symbol	测试条件 Tests Conditions	最小 Min	典型 Type	最大 Max	单位 Unit
正向最大连续电流 Maximum Continuous Drain-Source Diode Forward Current	I_S		-	-	2	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	8	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=2A	-	-	1.4	V
反向恢复时间 Reverse recovery time	t_{rr}	V_{GS}=0V, I_S=2A dI_F/dt=100A/μs (note 4)	-	260	-	ns
反向恢复电荷 Reverse recovery charge	Q_{rr}		-	1.2	-	μC

注释：

1：脉冲宽度由最高结温限制

2：L=55mH, I_{AS}=2A, V_{DD}=50V, R_G=25 Ω, 起始结温T_J=25℃

3：I_{SD} ≤2A, di/dt ≤300A/μs, V_{DD}≤BV_{DSS}, 起始结温T_J=25℃

4：脉冲测试：脉冲宽度≤300μs,占空比≤2%

5：基本与工作温度无关

Notes:

1：Pulse width limited by maximum junction temperature

2：L=55mH, I_{AS}=2A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃

3：I_{SD} ≤2A, di/dt ≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25℃

4：Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%

5：Essentially independent of operating temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

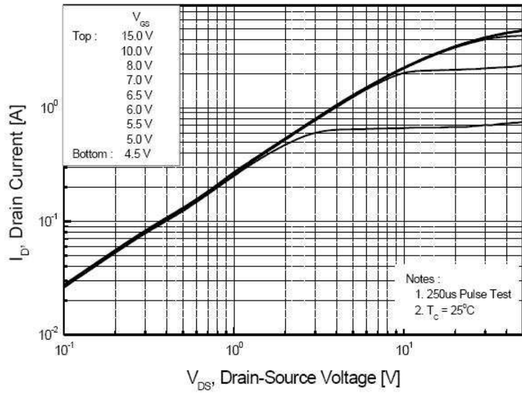


图1. 输出特性曲线

Fig. 1 On-State Characteristics

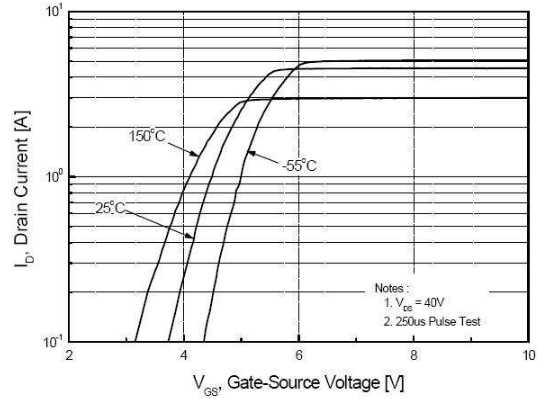


图2. 传输特性曲线

Fig. 2 Transfer Characteristics

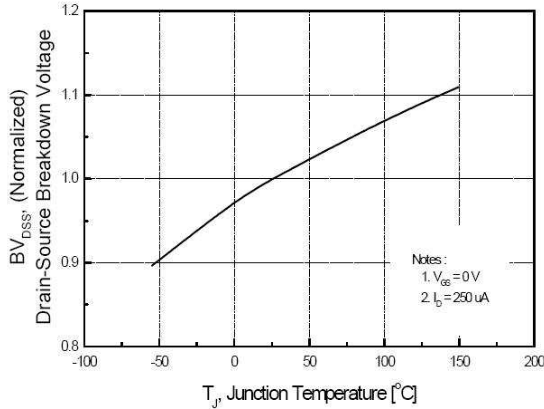


图3. 击穿电压随温度变化曲线

Fig. 3 Breakdown Voltage Variation vs Temperature

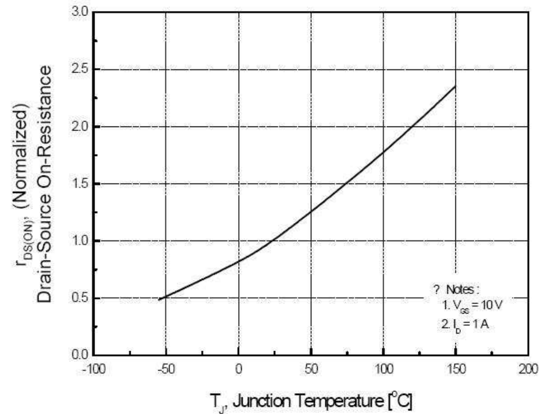


图4. 导通电阻随温度变化曲线

Fig. 4 On-Resistance Variation vs Temperature

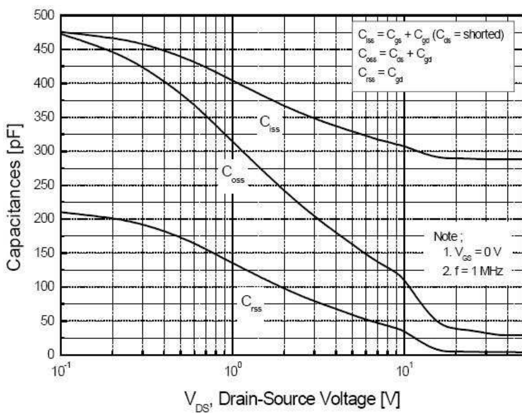


图5. 电容特性曲线

Fig. 5 Capacitance Characteristics

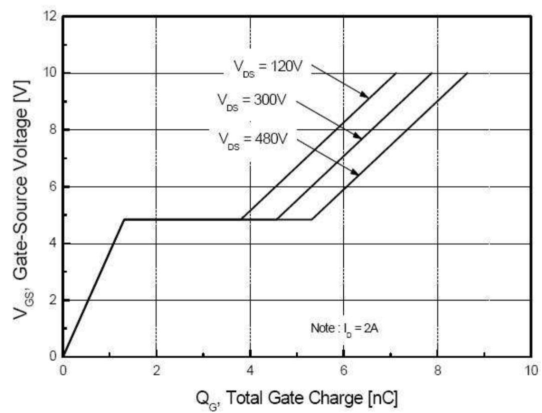
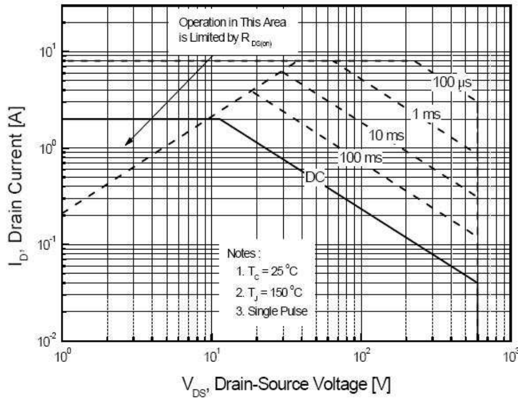


图6. 栅电荷特性曲线

Fig. 6 Gate Charge Characteristics



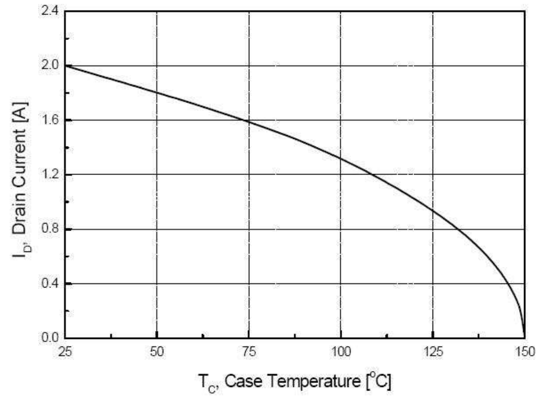
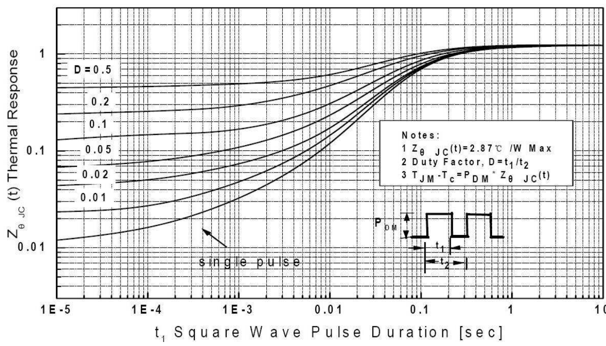


图7. 最大安全工作区
Fig. 7 Maximum Safe Operating Area

图8. 最大漏极电流随温度变化曲线
Fig. 8 Maximum Drain Current vs Case Temperature



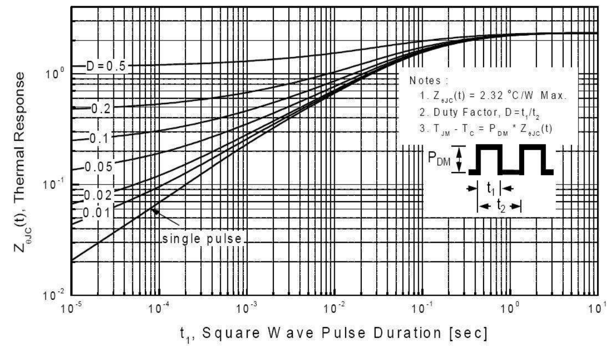
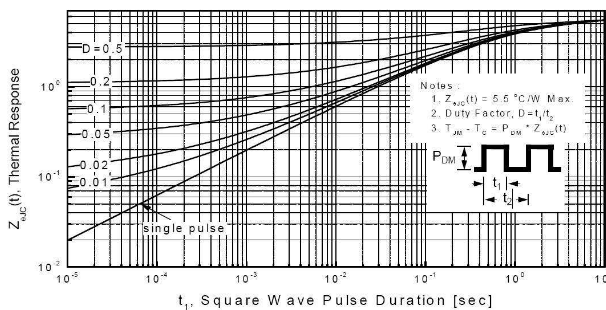


图9. 瞬态热响应曲线(TO-251/TO-252)
Fig. 9 Transient Thermal Response Curve
(TO-251/TO-252)

图10. 瞬态热响应曲线(TO-220)
Fig. 10 Transient Thermal Response Curve
(TO-220)



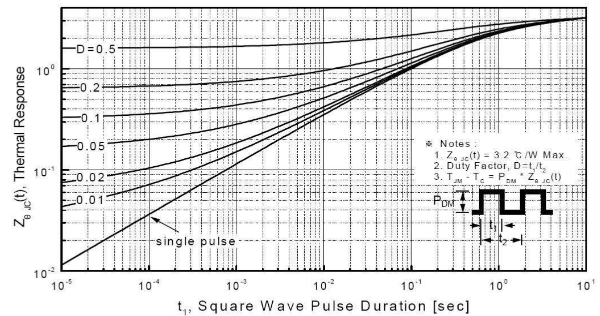


图11. 瞬态热响应曲线(TO-220F)
Fig. 11 Transient Thermal Response Curve
(TO-220F)

图12. 瞬态热响应曲线(TO-126)
Fig. 12 Transient Thermal Response Curve
(TO-126)

测试电路及波形 TEST CIRCUITS AND WAVEFORMS

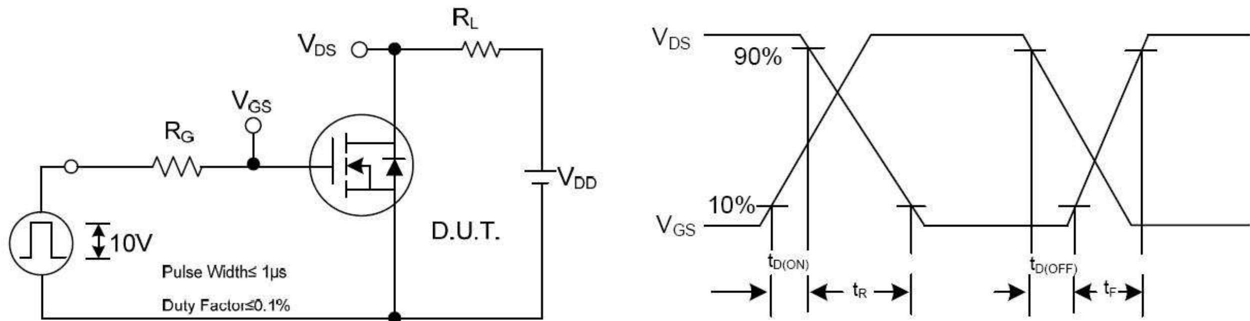


图13．开关特性测试

Fig.13 Resistive Switching Test Circuit & Waveforms

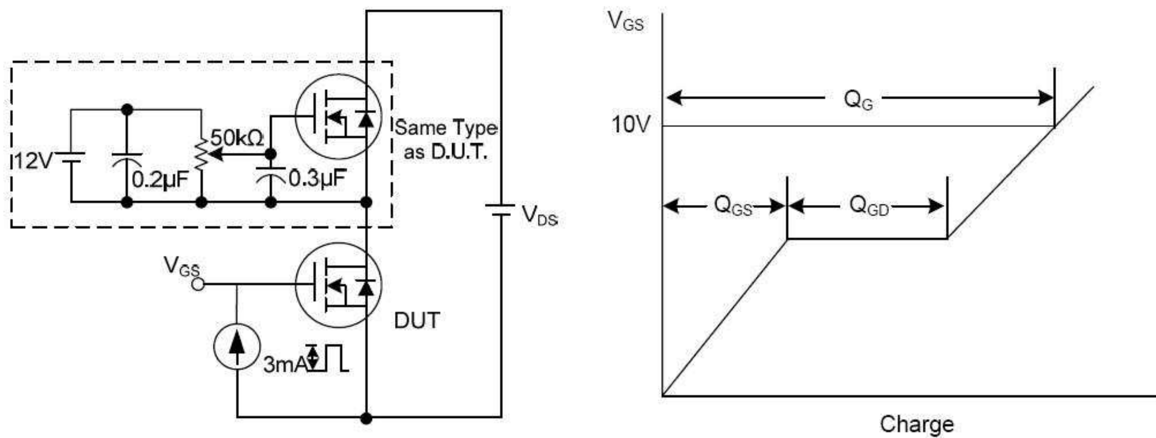


图14．栅电荷测试
Fig.14 Gate Charge Test Circuit & Waveform

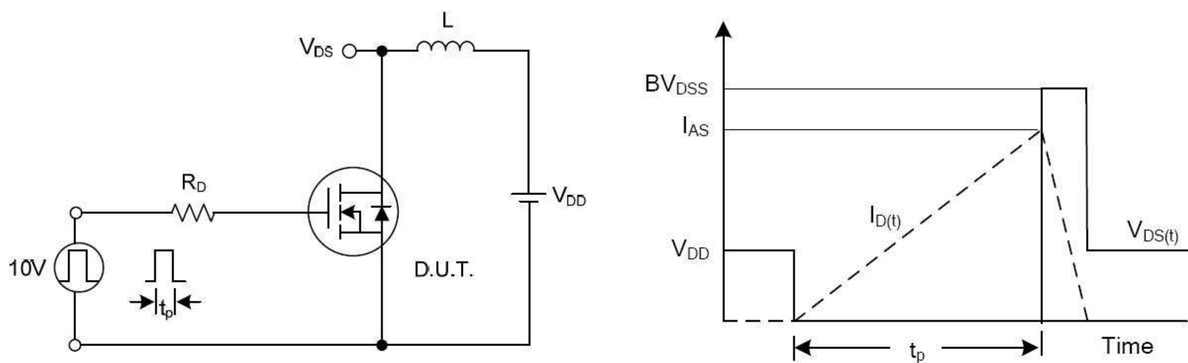
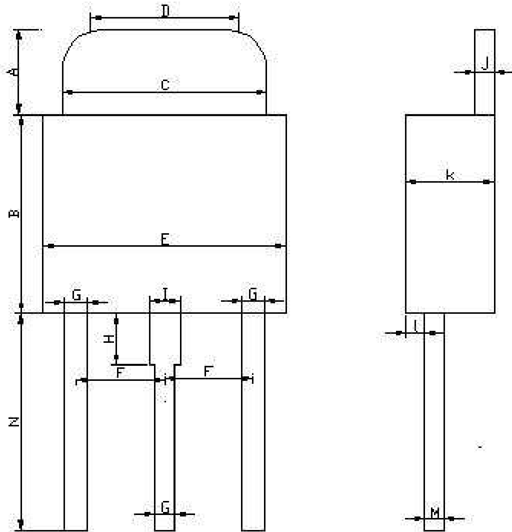


图15．雪崩能量测试
Fig.15 Unclamped Inductive Switching Test Circuit & Waveforms

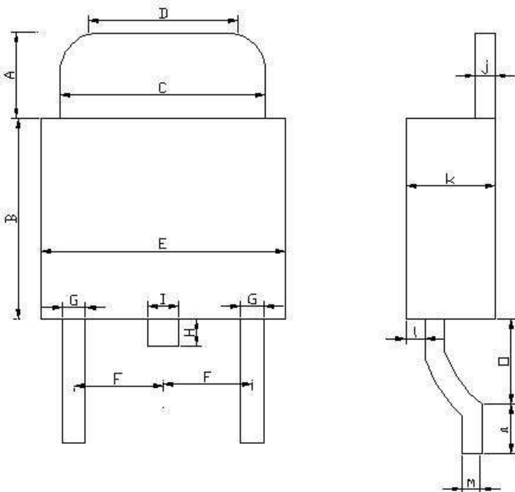
封装尺寸 TPACKAGE MECHANICAL DATA

TO-251



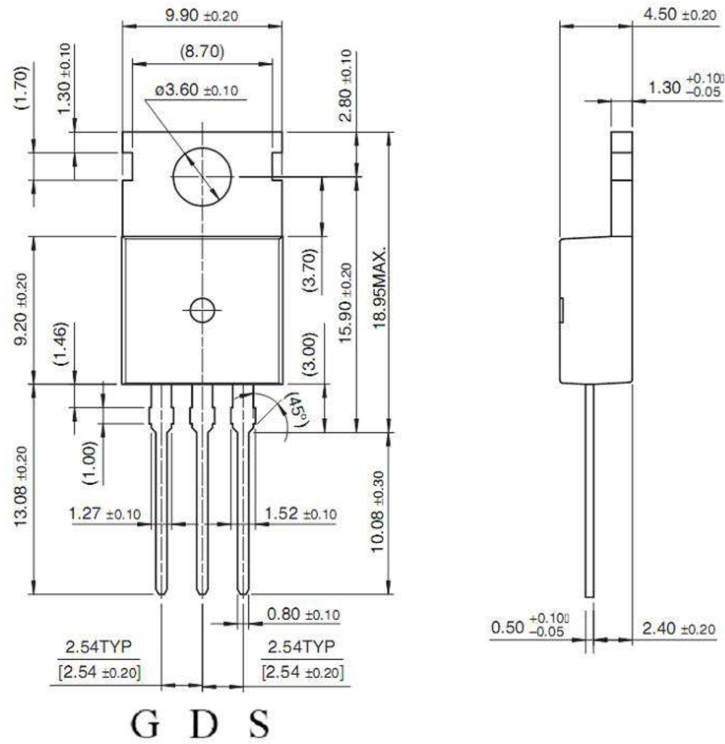
DIM	MILLIMETERS	DIM	MILLIMETERS
A	2.2±0.5	H	1.8±0.5
B	5.2±0.25	I	0.8±0.05
C	5.3±0.25	J	0.508±0.015
D	4.5±0.5	K	2.3±0.25
E	6.3±0.25	L	0.5±0.1
F	2.3±0.05	M	0.508±0.015
G	0.6±0.05	N	7.5±0.5

TO-252

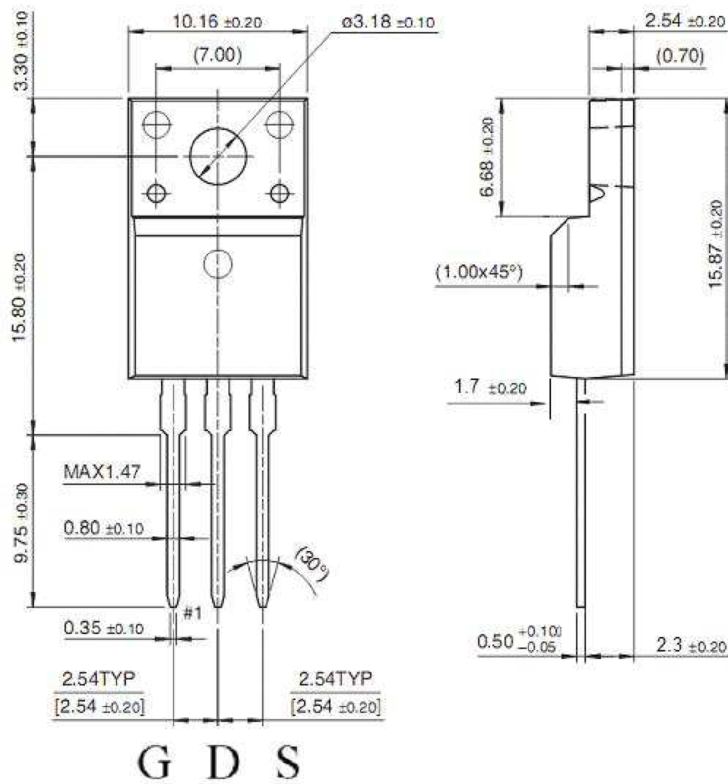


DIM	MILLIMETERS	DIM	MILLIMETERS
A	2.2±0.5	I	0.8±0.05
B	5.2±0.25	J	0.508±0.015
C	5.3±0.25	K	2.3±0.25
D	4.5±0.5	L	0.5±0.1
E	6.3±0.25	M	0.508±0.015
F	2.3±0.05	N	1.5±0.25
G	0.6±0.05	O	1.0±0.25
H	0.7±0.5		

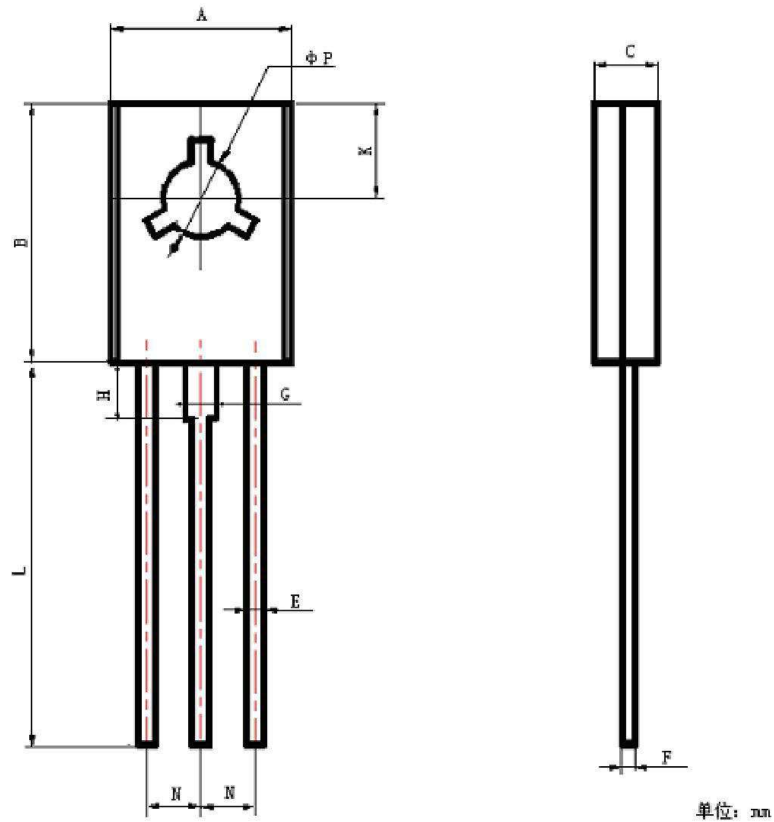
TO-220



TO-220F

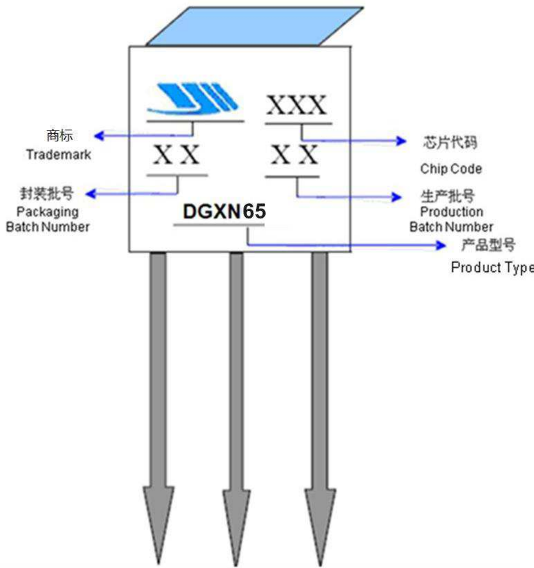


TO-126

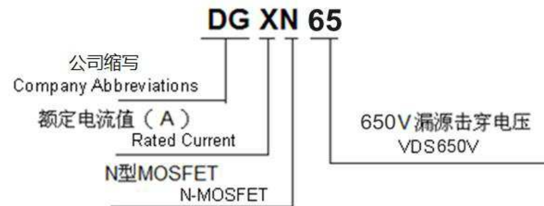


DIM	MILLIMETERS	
	MIN	MAX
A	7.40	7.80
B	10.50	11.10
C	2.60	2.80
E	0.60	0.80
F	0.40	0.60
G	1.17	1.37
H	1.90	2.30
K	3.90	4.10
L	15.50	16.50
N	2.09	2.49
φP	2.90	3.30

产品标记说明　Product labels



产品型号命名规则：　ProductNamingRules



修改履历　Revision History

修改时间 Date	修改内容Content modification	旧版本Last Rev.	新版本New Rev.

注意事项　Note

1、　在应用中，如果超出最大额定值使用势必会导致器件损伤，甚至造成永久失效，这将影响到整机系统的可靠性。建议在器件的80%最大额定值范围内使用。

2、　在安装散热片的时候，请注意扭矩及散热片的平整度。

3、　VDMOS是静电敏感型器件，在使用过程中需要采取必要的保护措施，以防器件遭受静电损伤。

4、　本说明书如有版本变更不另行通知。

1.　Exceeding the maximun ratings of the device in performance may cause damage to the device ，even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximun ratings of the device.

2.　When installing the heatsink , please pay attention to the torsional moment and the smoothness of the heatsink.

3.　VDMOSFETs is the device which is sensitive to the static electricity , it is necessary to protect the device from being damaged by the static electricity when using it.

4.　This publication is made by Dongchen Electronics and subject to regular change without notice.