

工业型号	公司型号	通俗命名	H	封装标识	包装方式	每管数量	每盒数量	每箱数量
FQU1N60C FQD1N60C	H1N60U H1N60D	1N60	HAOHAI	U: TO-251 D: TO-252	条管装 载带卷盘	80只/管 2.5K/卷	4Kpcs/盒 5Kpcs/盒	24Kpcs 25Kpcs

■ APPLICATION
ELECTRONIC BALLAST
ELECTRONIC TRANSFORMER
SWITCH MODE POWER SUPPLY

■ FEATURES
LOW ON-RESISTANCE
FAST SWITCHING
HIGH INPUT RESISTANCE
RoHS COMPLIANT
Package: TO-251 and TO-252 (IPAK & DPAK)


■ 特点
导通电阻低、开关速度快、输入阻抗高、符合RoHS规范

■ 应用范围
开关电源、LCD电源、LED驱动电源、机箱电源、UPS电源
各种充电器、电子整流器、电子变压器、逆变器、控制器
转换器、风扇控制板、
以及电源适配器、汽车稳压器等线性放大和功率开关电路


■ 封装形式
TO-251 (IPAK)、TO-252 (DPAK)

$I_D=1.3A$
 $V_{DS}=600V$
 $R_{DS(on)}=13\Omega$

1N60 Series Pin Assignment

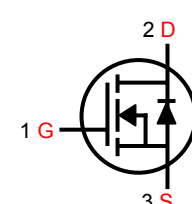


3-Lead Plastic TO-251
Package Code: U
Pin 1: Gate
Pin 2: Drain
Pin 3: Source



3-Lead Plastic TO-252
Package Code: D
Pin 1: Gate
Pin 2: Drain
Pin 3: Source

Series Symbol:



■ 最大额定 Absolute Maximum Ratings ($T_C=25^\circ C$)

参数 PARAMETER	符号 SYMBOL	额定值 VALUE	单位 UNIT
漏-源电压 Drain-source Voltage	V_{DS}	600	V
栅-源电压 gate-source Voltage	V_{GS}	± 30	
漏极电流 Continuous Drain Current	I_D	$T_C=25^\circ C$	1.0 *
		$T_C=100^\circ C$	0.6 *
最大脉冲电流 Drain Current — Pulsed ①	I_{DM}	4.0 *	A
耗散功率 Power Dissipation ($T_L=25^\circ C$)	P_D	28	
最高结温 Junction Temperature	T_j	150	$^\circ C$
存储温度 Storage Temperature	T_{STG}	-55~+150	
单脉冲雪崩能量 Single Pulse Avalanche Energy ②	E_{AS}	14	mJ

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

■ 电特性 Electronic Characteristics (T_C=25°C)

参数 PARAMETER	符号 SYMBOL	测试条件 TEST CONDITION	最小值 MIN	典型值 TYP	最大值 MAX	单位 UNIT
漏-源击穿电压 Drain-source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
击穿电压温度系数 Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _j	I _D =250μA Referenced to 25°C		0.6		V/°C
栅极开启电压 Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	2.0		4.0	V
漏-源漏电流 Drain-source Leakage Current	I _{DSS}	V _{DS} =600V V _{GS} =0V, T _j =25°C			25	μA
		V _{DS} =480V V _{GS} =0V, T _j =125°C			250	
跨导 Forward Transconductance	g _{FS}	V _{DS} =40V, I _D =0.5A ③	0.5			S

■ 订货方式 ORDERING INFORMATION

包装形式 PACKING	订货编码 ORDERING CODE	
	普通塑封料 Nomal Package Material	无卤塑封料 Halogen Free
TO-251 普通袋装 NORMAL PACKING	H1N60U	H1N60U-PbF
TO-251 条管装 TUBE PACKING	H1N60U-TU	H1N60U-TU-PbF
TO-252 条管装 TUBE PACKING	H1N60D-TU	H1N60D-TU-PbF
TO-252 载带卷盘装 TAPE & REEL PACKING	H1N60D-TR	H1N60D-TR-PbF

■ 包装规格 Packaging Specifications

TO-251	条管装, 每管80只, 每盒4000只, 每箱24000只 (80Pcs/Tube, 4Kpcs/BOX, 24Kpcs/Carton)
TO-252	条管装, 每管80只, 每盒4000只, 每箱24000只 (80Pcs/Tube, 4Kpcs/BOX, 24Kpcs/Carton)
	每卷盘2500只, 每盒5000只, 每箱25000只 (2.5Kpcs/Reel, 5Kpcs/BOX, 25Kpcs/Carton)

■ Electrical Characteristics (T_c=25°C)

参数 PARAMETER	符号 SYMBOL	测试条件 TEST CONDITION	最小值 MIN	典型值 TYP	最大值 MAX	单位 UNIT
栅极漏电流 Gate-body Leakage Current (V _{DS} =0)	I _{GSS}	V _{GS} =±30V			±100	nA
漏-源导通电阻 Static Drain-source On Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =0.5A ③		13	15	Ω
输入电容 Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V F=1.0MHZ		130		pF
关断延迟时间 Turn -Off Delay Time	T _{d(off)}	V _{DD} =300V, I _D =1.0A R _G =25Ω ③		13		nS
栅极电荷 Total Gate Charge	Q _g	I _D =1.0A V _{DS} =480V V _{GS} =10V ③		4.8		nC
栅源电荷 Gate-to-Source Charge	Q _{gs}			0.7		
栅漏电荷 Gate-to-Drain Charge	Q _{gd}			2.7		
二极管正向电流 Continuous Diode Forward Current	I _s				1.0	A
二极管正向压降 Diode Forward Voltage	V _{SD}	T _j =25°C, I _s =0.5A V _{GS} =0V ③			1.4	V
反向恢复时间 Reverse Recovery Time	T _{rr}	T _j =25°C I _F =1.0A di/dt=100A/μs ③		190		nS
反向恢复电荷 Reverse Recovery Charge	Q _{rr}			0.53		μC

■ 热特性 Thermal Characteristics

参数 PARAMETER	符号 SYMBOL	最大值 MAX	单位 UNIT
热阻结-环境 Thermal Resistance Junction-lead	R _{thJL}	4.46	°C/W
热阻结-环境 Thermal Resistance Junction-ambient	R _{thJA}	110	

注释 (Notes):

- ① 脉冲宽度: 以最高结温为限制 (Repetitive rating: Pulse width limited by maximum junction temperature)
- ② 初始结温=25°C, V_{DD}=50V, L=30mH, R_G=25Ω, I_{AS}=1.0A (Starting T_j=25°C, V_{DD}=50V, L=30mH, R_G=25Ω, I_{AS}=1.0A)
- ③ 脉冲测试: 脉冲宽度≤300μs, 占空比≤2% (Pulse Test: Pulse width ≤300μs, Duty cycle ≤2%)

■ 特性曲线 Typical Performance Characteristics

图1: 输出特性曲线, $T_c=25^\circ\text{C}$

Fig1: Typical Output Characteristics, $T_c=25^\circ\text{C}$

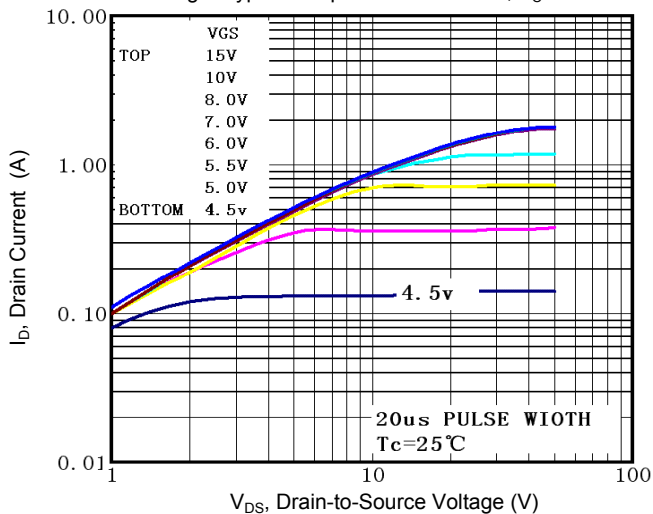


图2: 输出特性曲线, $T_c=150^\circ\text{C}$

Fig2: Typical Output Characteristics, $T_c=150^\circ\text{C}$

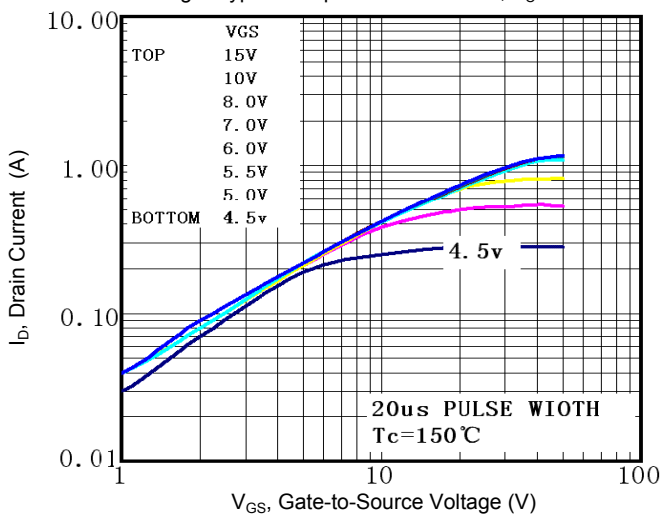


图3: 归一化导通电阻与温度曲线图

Fig3: Normalized On-Resistance Vs. Temperature

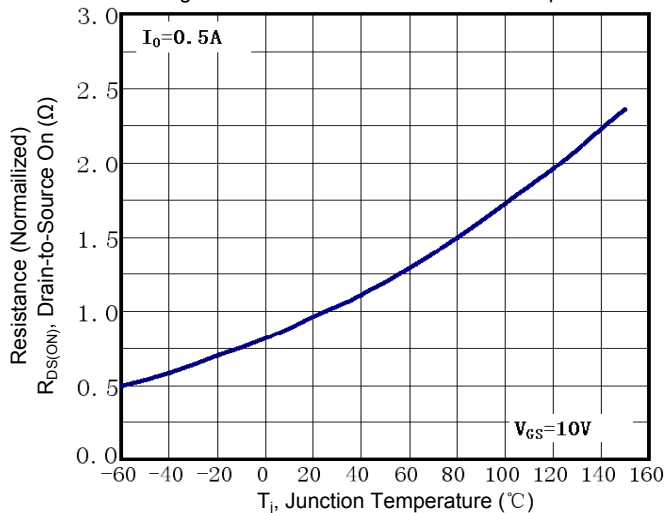


图4: 二极管正向电压曲线

Fig4: Typical Source-Drain Diode Forward Voltage

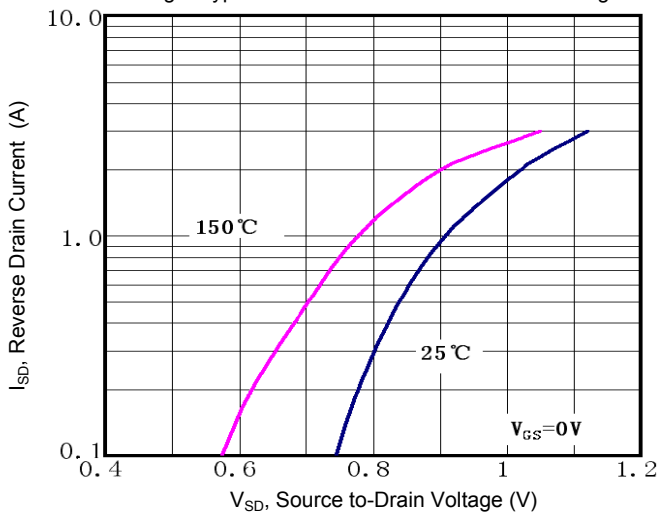


图5: 最大漏极电流与壳温曲线

Fig5: Maximum Drain Current Vs. Case Temperature

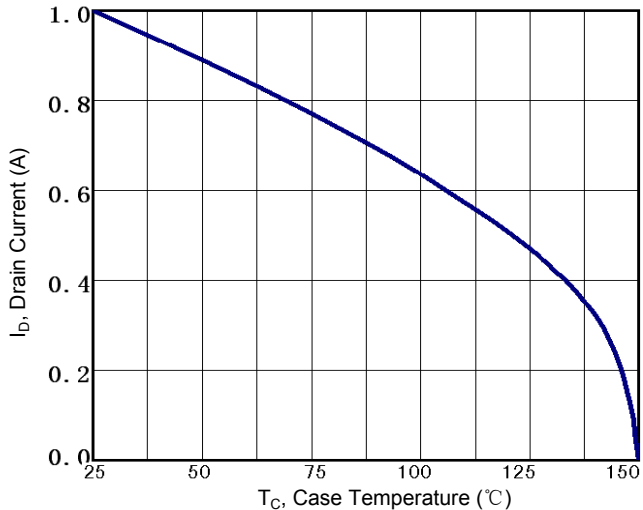
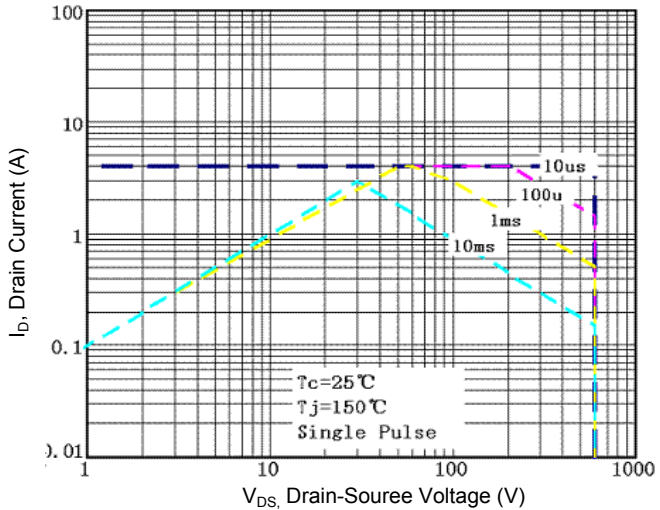


图6: 最大安全工作区曲线

Fig6: Maximum Safe Operating Area



PACKAGE DIMENSIONS

■ TO-251 (IPAK) Dimension (封装尺寸数据, 单位: mm)			MILLIMETERS		元件打印标识
DIM	MILLIMETERS		Min.	Max.	
	A	5.97	6.35		
B	6.35	6.73			
C	2.19	2.38			
D	0.69	0.88			
E	0.84	1.01			
F	0.94	1.19			
G	2.29 BSC				
H	0.87	1.01			
J	0.46	0.58			
K	8.89	9.65			
R	4.45	5.46			
S	1.27	2.28			
V	0.77	1.27			

■ TO-252 (DPAK) Dimension (封装尺寸数据, 单位: mm)			MILLIMETERS		元件打印标识
DIM	MILLIMETERS		Min.	Max.	
	A	5.97	6.35		
B	6.35	6.73			
C	2.19	2.38			
D	0.69	0.88			
E	0.84	1.01			
F	0.94	1.19			
G	4.58 BSC				
H	0.87	1.01			
J	0.46	0.58			
K	2.60	2.89			
L	2.29 BSC				
R	4.45	5.46			
S	0.51	1.27			
U	0.51	--			
V	0.77	1.27			
Z	3.51	--			

Manufacturers version information

2007-03-11, HAOHAI™ Product Data-S1.0

2010-04-10, HAOHAI™ Product Data-S1.1

2014-07-11, HAOHAI™ Product Data-1R3



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