

HM1N60

主要参数 MAIN CHARACTERISTICS

Id	0.5 A	TO-92
	1.0 A	IPAK/DPKA
Vdss	600 V	
Rdson (Vgs=10V)	15 Ω	
Qg	6.1 nC	

用途

- 高频开关电源
- 电子镇流器

APPLICATIONS

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge

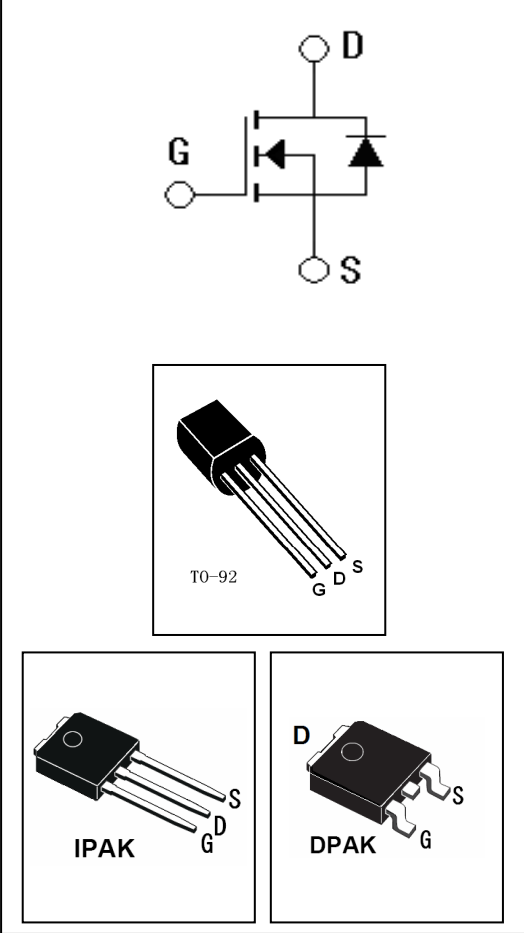
产品特性

- 低栅极电荷
- 低 Crss (典型值 3.7pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品

FEATURES

- Low gate charge
- Low Crss (typical 3.7pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

封装 Package



订货信息 ORDER MESSAGE

订货型号 Order codes	印 记 Marking	封 装 Package	无卤素 Halogen Free	包 装 Packaging	器件重量 Device Weight
HM1N60	HM1N60	TO-92	否 NO	编带 Brede	0.216 g(typ)
HM1N60I	HM1N60I	IPAK	否 NO	条管 Tube	0.350 g(typ)
HM1N60K	HM1N60K	DPAK	否 NO	条管 Tube	0.300 g(typ)

绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项 目 Parameter	符 号 Symbol	数 值 Value		单 位 Unit
		HM1N60	HM1N60I/K	
最高漏极-源极直流电压 Drain-Source Voltage	V_{DSS}	600	600	V
连续漏极电流 Drain Current -continuous	I_D T=25℃ T=100℃	0.5	1.0	A
		0.31	0.62	A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	I_{DM}	2.0	4.0	A
最高栅源电压 Gate-Source Voltage	V_{GSS}	± 30		V
单脉冲雪崩能量 (注2) Single Pulsed Avalanche Energy (note 2)	E_{AS}	47		mJ
雪崩电流 (注1) Avalanche Current (note 1)	I_{AR}	1.0		A
重复雪崩能量 (注1) Repetitive Avalanche Current (note 1)	E_{AR}	3.0		mJ
二极管反向恢复最大电压变化速率 (注3) Peak Diode Recovery dv/dt (note 3)	dv/dt	4.2	4.2	V/ns
耗散功率 Power Dissipation	P_D T _C =25℃ -Derate above 25℃	3.0	30	W
		0.025	0.24	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T _J , T _{STG}	-55~+150		℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	300		℃

电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单 位 Units
关态特性 Off –Characteristics						
漏—源击穿电压 Drain-Source Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	600	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=1mA$, referenced to $25^\circ C$	-	0.60	-	V/ $^\circ C$
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V, T_C=25^\circ C$	-	-	10	μA
		$V_{DS}=480V, T_C=125^\circ C$	-	-	100	μA
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						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=0.5A$	-	11	15	Ω
正向跨导 Forward Transconductance	g_{fs}	$V_{DS}=40V, I_D=0.5$ (note 4)	-	0.8	-	S
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	178	221	pF
输出电容 Output capacitance	C_{oss}		-	19	27	pF
反向传输电容 Reverse transfer capacitance	C_{rss}		-	3.7	4.8	pF

电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=300V, I_D=1.0A, R_G=25\Omega$ (note 4, 5)	-	15	45	ns
上升时间 Turn-On rise time	t_r		-	46	105	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	26	62	ns
下降时间 Turn-Off Fall time	t_f		-	37	82	ns
栅极电荷总量 Total Gate Charge	Q_g	$V_{DS}=480V$, $I_D=1.0A$ $V_{GS}=10V$ (note 4, 5)	-	6.1	7.2	nC
栅—源电荷 Gate-Source charge	Q_{gs}		-	1.0	-	nC
栅—漏电荷 Gate-Drain charge	Q_{gd}		-	3.0	-	nC
漏—源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
正向最大连续电流 Maximum Continuous Drain -Source Diode Forward Current	I_S		-	-	1.0	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	4.0	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1.0A$	-	-	1.0	V
反向恢复时间 Reverse recovery time	t_{rr}	$V_{GS}=0V, I_S=1.0A$ $dI_F/dt=100A/\mu s$ (note 4)	-	185	-	ns
反向恢复电荷 Reverse recovery charge	Q_{rr}		-	0.51	-	μC

热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大 Max		单 位 Unit
		HM1N60	HM1N60I/K	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	—	4.75	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	120	105	$^{\circ}C/W$

注释:

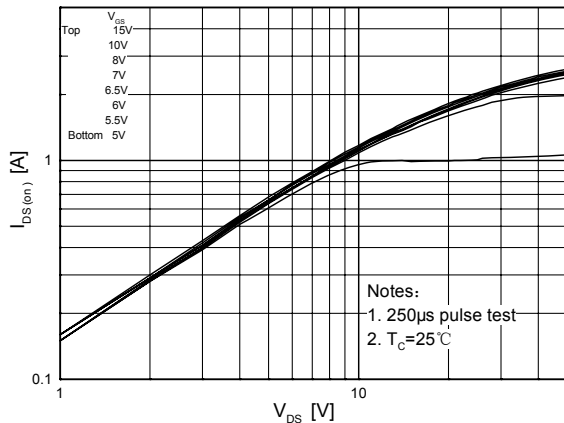
- 1: 脉冲宽度由最高结温限制
- 2: $L=59mH, I_{AS}=1.0A, V_{DD}=50V, R_G=25\Omega$, 起始结温 $T_J=25^{\circ}C$
- 3: $I_{SD} \leq 1.0A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, 起始结温 $T_J=25^{\circ}C$
- 4: 脉冲测试: 脉冲宽度 $\leq 300\mu s$, 占空比 $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

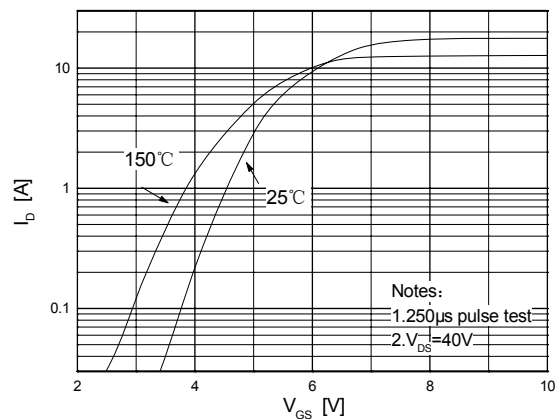
- 1: Pulse width limited by maximum junction temperature
- 2: $L=59mH, I_{AS}=1.0A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^{\circ}C$
- 3: $I_{SD} \leq 1.0A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 5: Essentially independent of operating temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

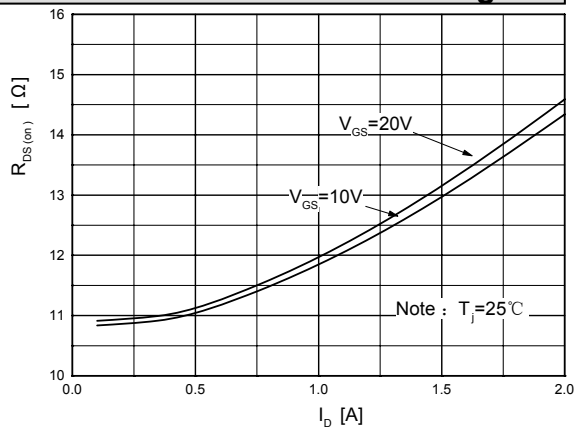
On-Region Characteristics



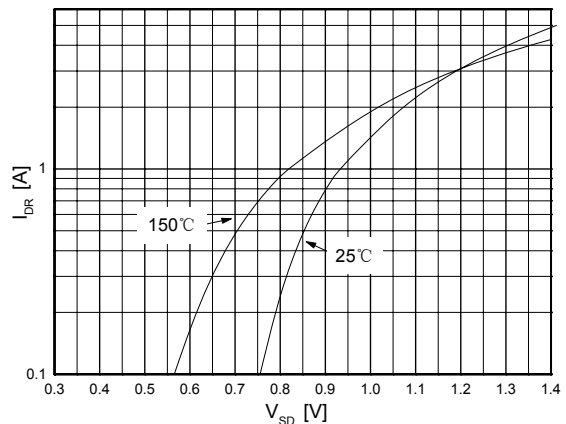
Transfer Characteristics



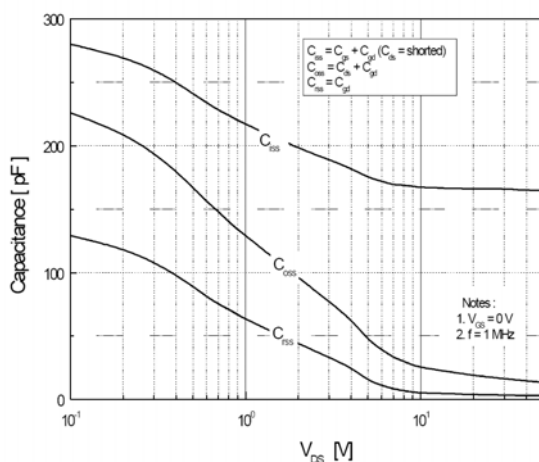
On-Resistance Variation vs. Drain Current and Gate Voltage



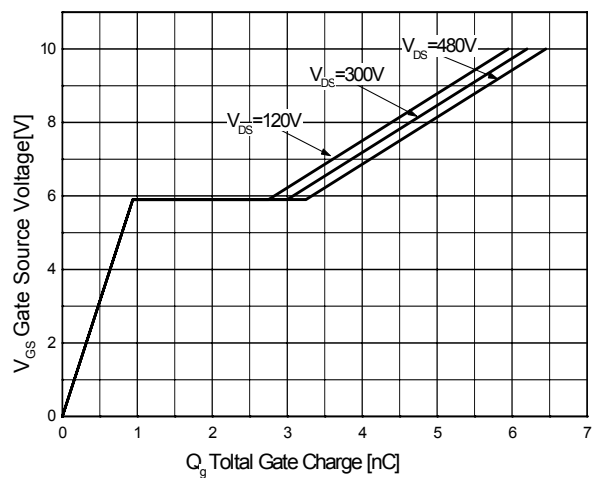
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance Characteristics

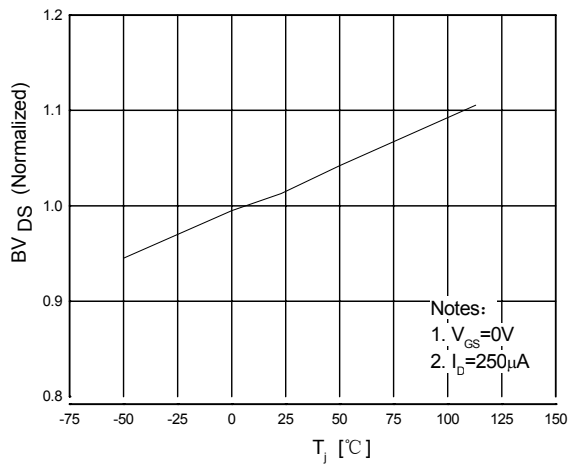


Gate Charge Characteristics

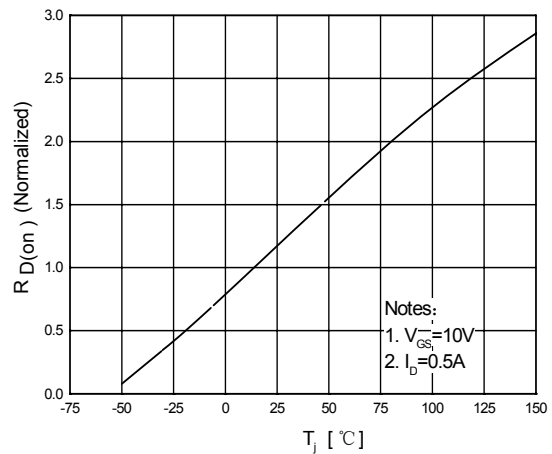


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

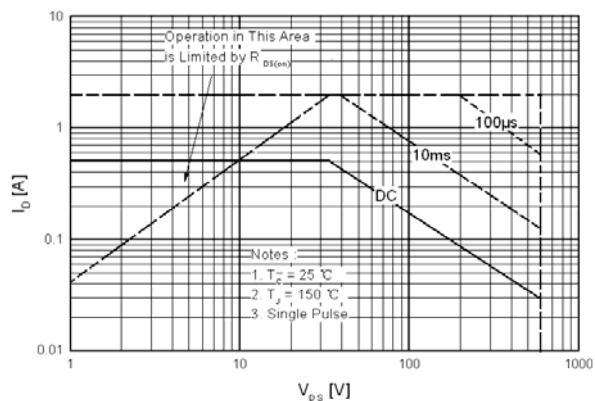
**Breakdown Voltage Variation
vs. Temperature**



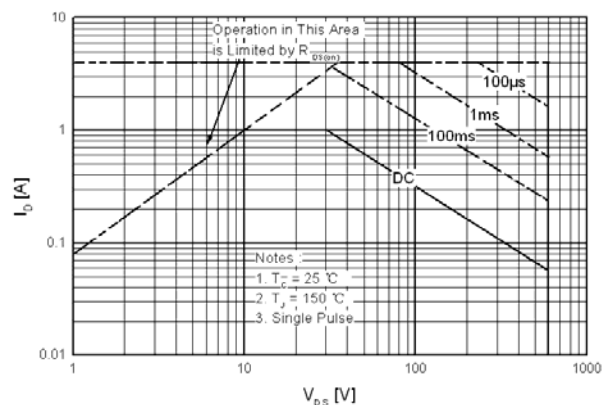
**On-Resistance Variation
vs. Temperature**



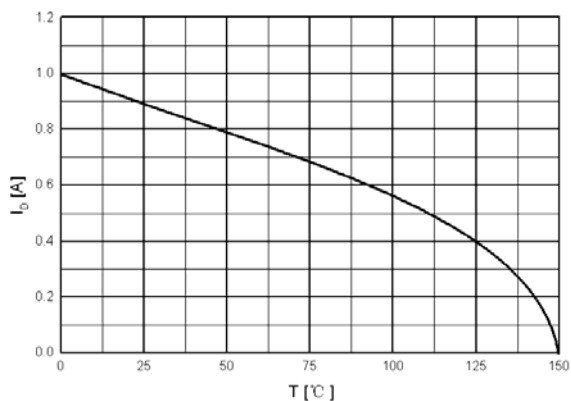
**Maximum Safe Operating Area
For HM1N60**



**Maximum Safe Operating Area
For HM1N60/K**

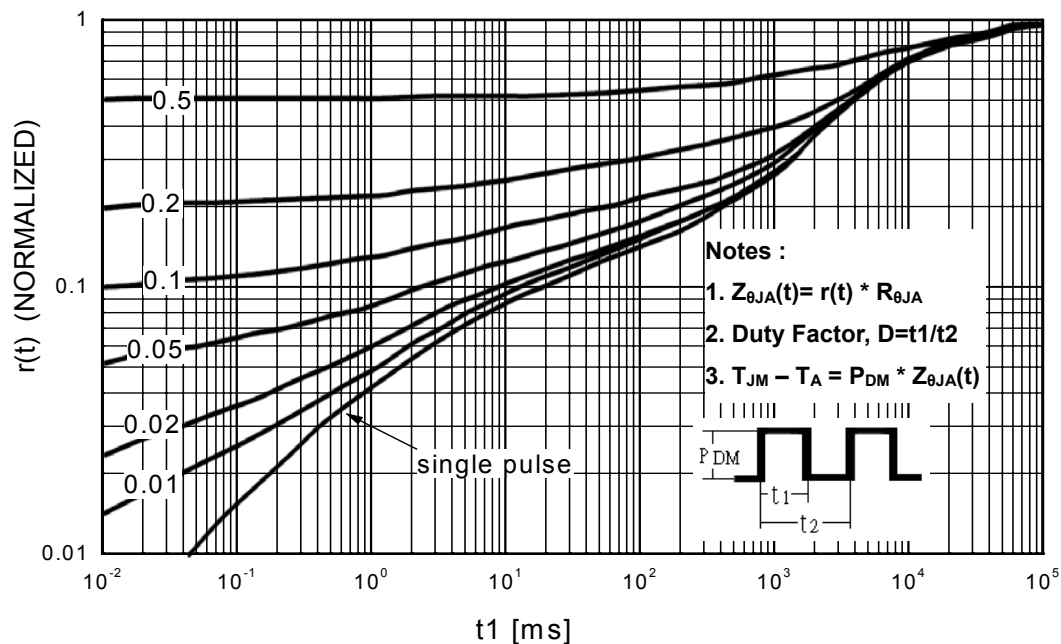


**Maximum Drain Current
vs. Case Temperature**

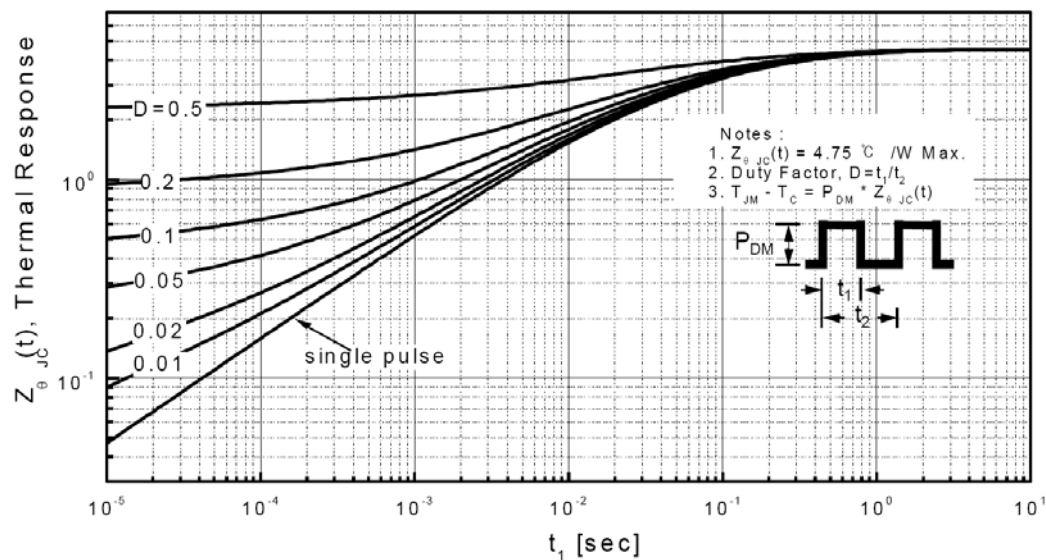


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

Transient Thermal Response Curve
For HM1N60



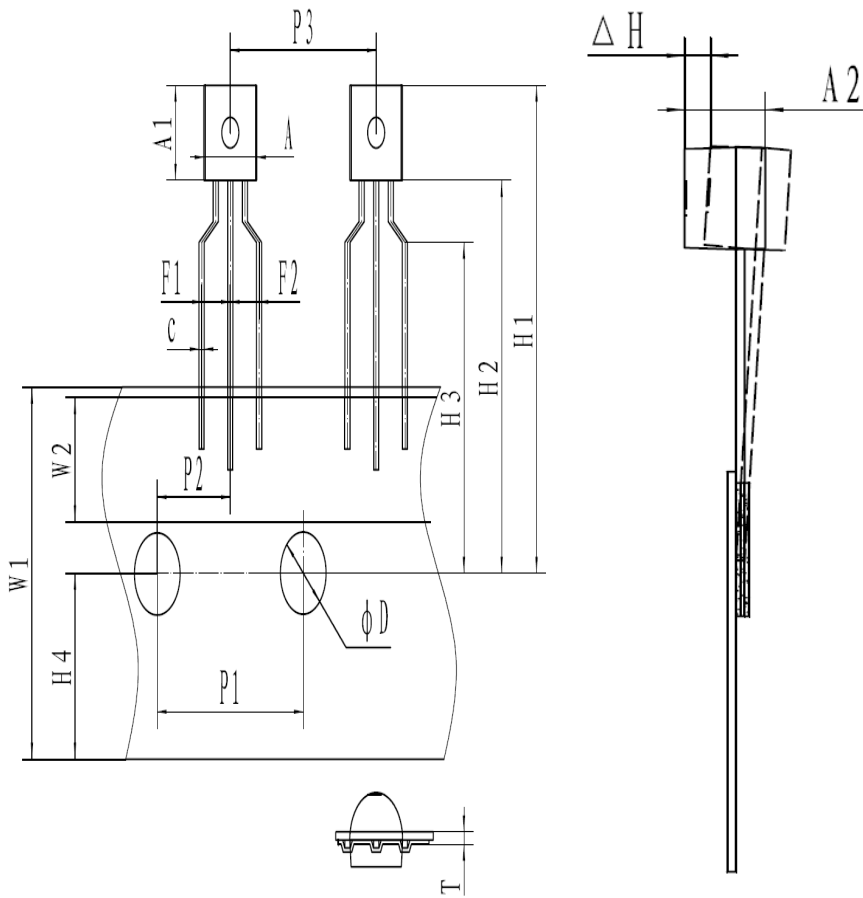
Transient Thermal Response Curve
For HM1N60I/K



外形尺寸 PACKAGE MECHANICAL DATA

TO-92

单位 Unit : mm

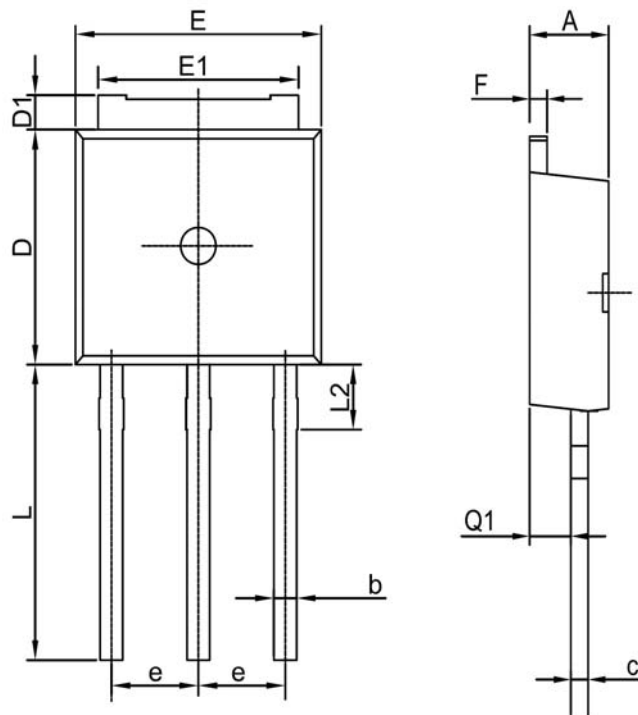


符号 symbol	min	max
A	4.5	4.7
A1	4.5	4.7
A2	3.5	3.7
c	TYP 0.45	
F1/F2	2.2	2.8
W1	17.5	18.5
W2	5.5	6.5
H1	22.0	27.0
H2	18.0	20.0
H3	15.0	17.0
H4	8.5	9.5
P1	12.5	12.9
P2	6.0	6.7
P3	12.5	12.9
T	0.40	0.45
ϕD	3.8	4.2
ΔH	0	1.0

外形尺寸 PACKAGE MECHANICAL DATA

IPAK Gh

单位 Unit: mm

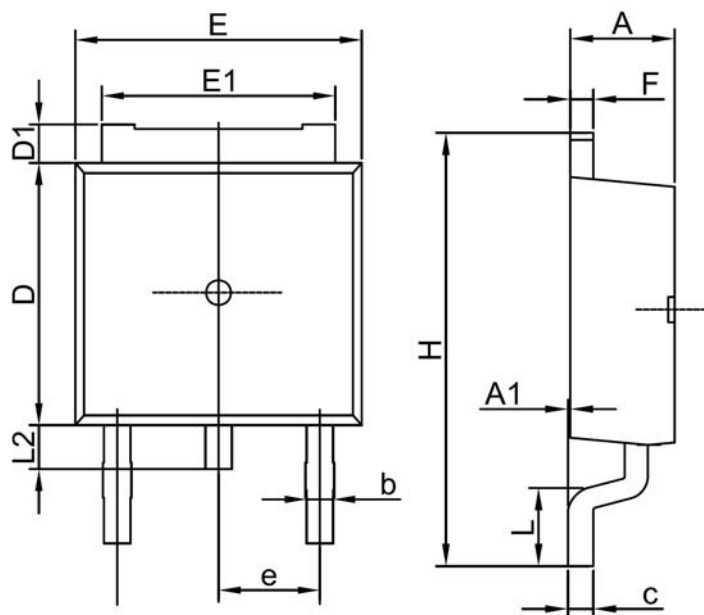


符号 symbol	MIN	MAX
A	2.2	2.4
b	0.7	0.9
c	0.45	0.55
D	6.0	6.3
D1	0.8	1.2
E	6.5	6.8
E1	5.2	5.5
e	2.28TYP	
F	0.45	0.55
L	6.85	7.15
L2	1.8	2.2
Q1	0.8	1.2

外形尺寸 PACKAGE MECHANICAL DATA

DPAK Gh

单位 Unit: mm

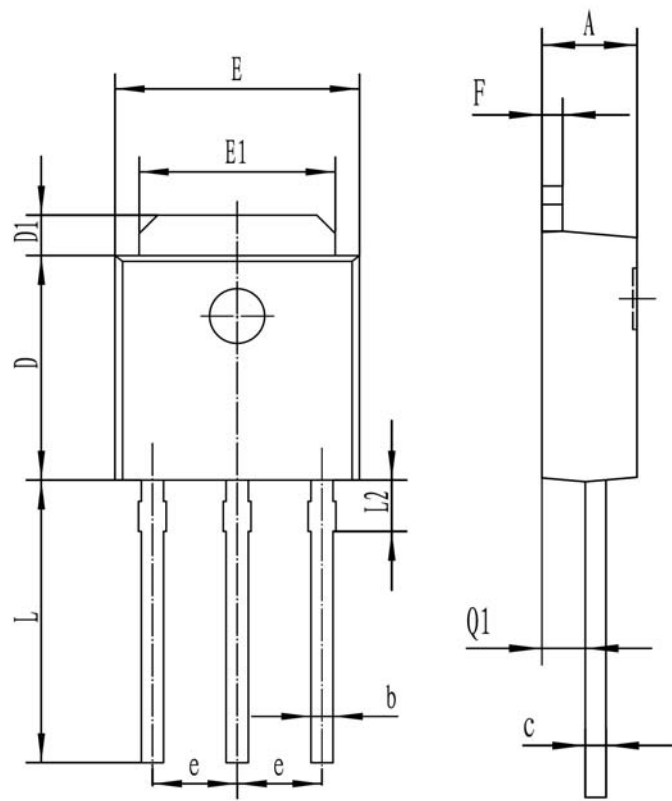


符号 symbol	MIN	MAX
A	2.2	2.4
A1	0.0	0.2
b	0.7	0.9
c	0.45	0.55
D	6.0	6.3
D1	0.8	1.2
E	6.5	6.8
E1	5.2	5.5
e	2.28TYP	
F	0.45	0.55
H	9.65	10.45
L	1.0	1.3
L2	0.7	1.3

外形尺寸 PACKAGE MECHANICAL DATA

IPAK Gf

单位 Unit: mm

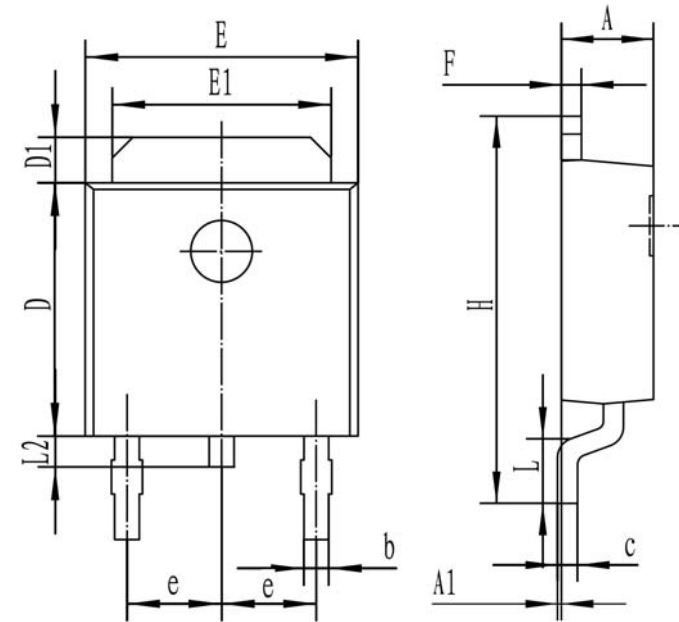


符号 symbol	MIN	MAX
A	2.20	2.40
b	0.60	0.74
c	0.45	0.55
D	5.95	6.25
D1	0.95	1.25
E	6.45	6.75
E1	5.2	5.4
e	2.24	2.34
F	0.45	0.55
L	7.5	7.9
L2	1.0	2.0
Q1	0.95	1.15

外形尺寸 PACKAGE MECHANICAL DATA

DPAK Gf

单位 Unit: mm



符号 symbol	MIN	MAX
A	2.20	2.40
A1	0	0.1
b	0.50	0.70
c	0.45	0.55
D	5.95	6.25
D1	0.95	1.25
E	6.45	6.75
E1	5.2	5.4
e	2.24	2.34
F	0.45	0.55
H	9.45	9.95
L	1.25	1.75
L2	0.6	0.9