

60R068F

主要参数 MAIN CHARACTERISTICS

I_D	48A
V_{DS}	600V
$R_{ds(on)} (V_{GS}=10V)$	68mΩ

用途

- 负载开关
- 脉宽调制
- 电源管理

APPLICATIONS

- Load Switch
- PWM Application
- Power Management

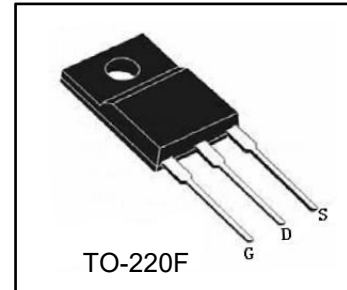
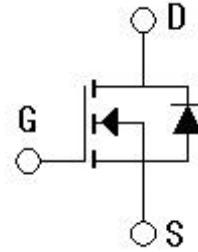
产品特性

- 先进沟槽技术
- 符合环保标准
- 产品无卤素
- 湿敏等级3级

FEATURES

- Advanced Trench Technology
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 3

封装 Package



产品中有毒有害物质或元素的名称及含量

部件名称	有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
(含量要求)	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
引线框	○	○	○	○	○	○
塑封树脂	○	○	○	○	○	○
管芯	○	○	○	○	○	○
内引线	○	○	○	○	○	○
焊料	×	○	○	○	○	○
说明	○: 表示该元素的含量在 SJ/T11363-2006 标准的限量要求以下。 ×: 表示该元素的含量超出 SJ/T11363-2006 标准的限量要求。 目前产品的焊料中含有铅 (Pb) 成分, 但属于欧盟 RoHS 指令豁免范围。					

绝对最大额定值 **ABSOLUTE RATINGS** ($T_c=25^{\circ}\text{C}$)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
最高漏极-源极直流电压 Drain-Source Voltage	V_{DS}	600	V
连续漏极电流 Drain Current-continuous	I_D $T=25^{\circ}\text{C}$ $T=100^{\circ}\text{C}$	48 30	A
最大脉冲漏极电流 Drain Current – pulse ^{Note 1}	I_{DM}	144	A
最高栅源电压 Gate-Source Voltage	V_{GS}	± 30	V
单脉冲雪崩能量 Single Pulsed Avalanche Energy ^{Note 2}	E_{AS}	750	mJ
重复雪崩能量 Avalanche Energy, Repetitive ^{Note 3}	E_{AR}	0.6	mJ
重复雪崩电流 Avalanche Current, Repetitive ^{Note 3}	I_{AR}	5	A
二极管电压变化率 Peak Diode Recovery dv/dt ($V_{DS}=0\sim 480\text{V}$, $I_{SD}\leq I_D$)	dv/dt	50	V/ns
漏极-源极电压变化率 Drain Source voltage slope ($V_{DS}=0\sim 480\text{V}$)	dV_{DS}/dt	50	V/ns
耗散功率 Power Dissipation	P_D $T_C=25^{\circ}\text{C}$	284	W
最高结温及存储温度 Operating and Storage Temperature Range	T_J , T_{STG}	$-55\sim +150$	$^{\circ}\text{C}$

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 =1mA, V _{GS} =0V, T _J =25℃	600	-	-	V
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℃	-	-	10	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 =1mA	3.0	4.0	5.0	V
静态导通电阻 Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =24A	-	57	68	mΩ
		V _{GS} =10V , I _D =24A, T _j =150℃	-	150	-	mΩ
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{iss}	V _{DS} =100V, V _{GS} =0V, f=100KHz	-	3400	-	pF
输出电容 Output capacitance	C _{oss}		-	120	-	pF
反向传输电容 Reverse transfer capacitance	C _{rss}		-	4.3	-	pF

电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=400V, I_D=24A, R_G=2.5\Omega$ $V_{GS}=10V$	-	32	-	ns
上升时间 Turn-On rise time	t_r		-	32	-	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	42	-	ns
下降时间 Turn-Off Fall time	t_f		-	22.5	-	ns
栅极电荷总量 Total Gate Charge	Q_g	$V_{DS}=480V,$ $I_D=24A$ $V_{GS}=10V$	-	70	-	nC
栅-源电荷 Gate-Source charge	Q_{gs}		-	22	-	nC
栅-漏电荷 Gate-Drain charge	Q_{gd}		-	28	-	nC
栅极电阻 Gate Resistance	R_g	$f=1MHz$	-	1.9	-	Ω
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		-	48	-	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=48A$	-	0.88	1.2	V
反向恢复时间 Reverse Recovery Time	T_{RR}	$V_{GS}=0V, V_{DS}=300V,$ $I_S=24A, di_F/dt=100A/\mu s$	-	200	-	ns
反向恢复电荷 Reverse Recovery Charge	Q_{RR}		-	1.4	-	μC
反向恢复电流 Peak Reverse Recovery Current	I_{RR}		-	13.7	-	A

热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符号 Symbol	值 Value	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.38	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction-to-Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$

NOTES:

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L =60mH, IAS =5A, VDD = 50V, RG=25 Ω , Starting at TJ = 25 $^{\circ}C$

特征曲线 ELECTRICAL CHARACTERISTICS

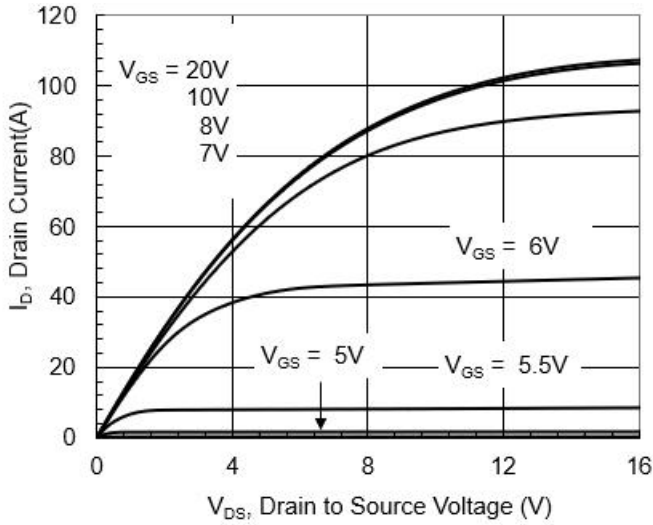
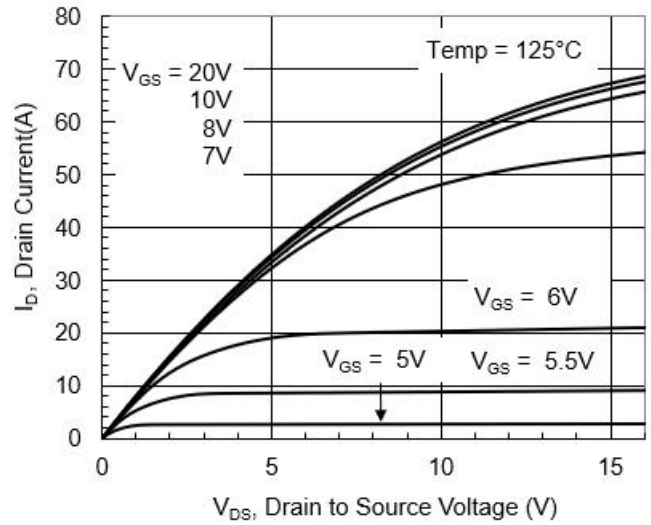
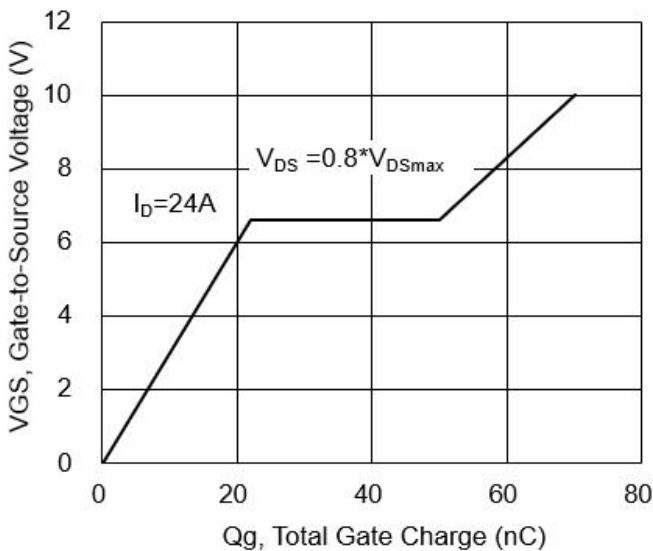
Fig1. Output characteristics $T_J = 25^\circ\text{C}$ Fig2. Output characteristics $T_J = 125^\circ\text{C}$ 

Fig3. Gate charge characteristics

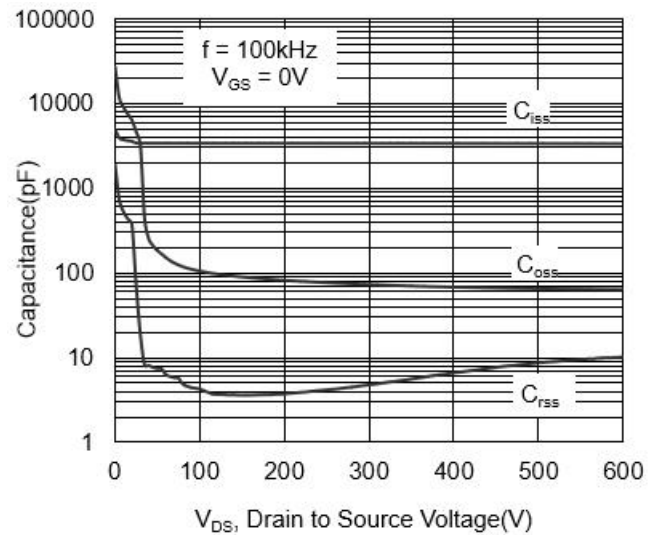
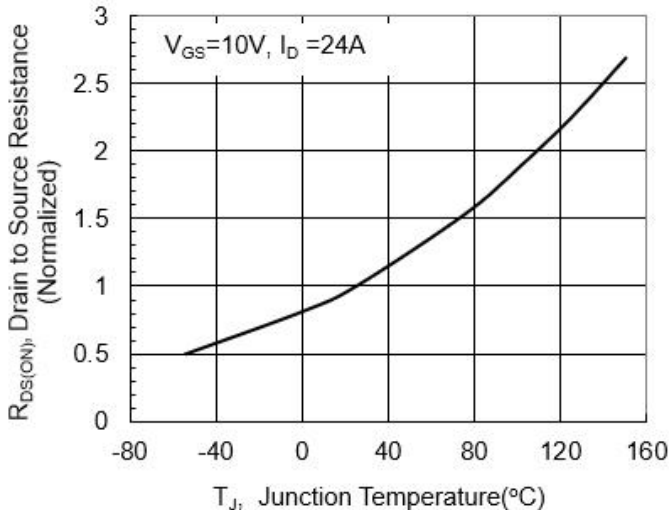
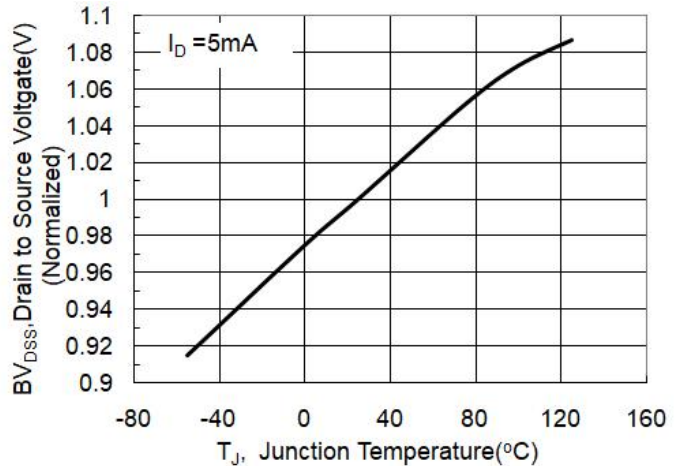


Fig4. Capacitance Characteristics

Fig5. $R_{DS(ON)}$ vs junction temperatureFig6. B_{VDSS} vs junction temperature

特征曲线 ELECTRICAL CHARACTERISTICS

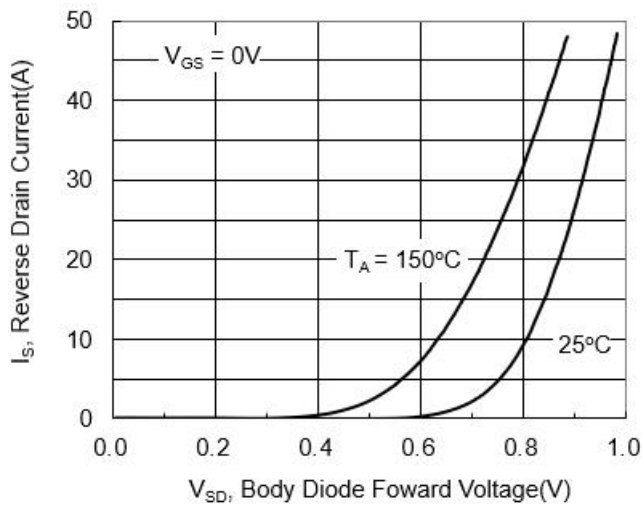


Fig 7 . Forward characteristics of reverse diode

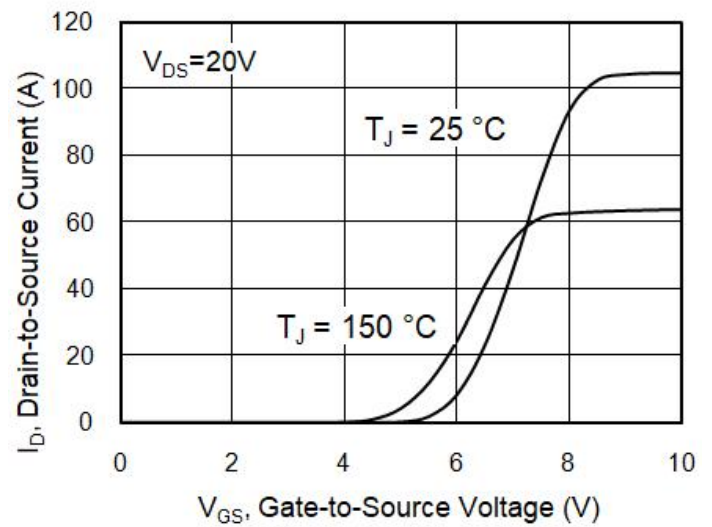


Fig 8 . Transfer characteristics

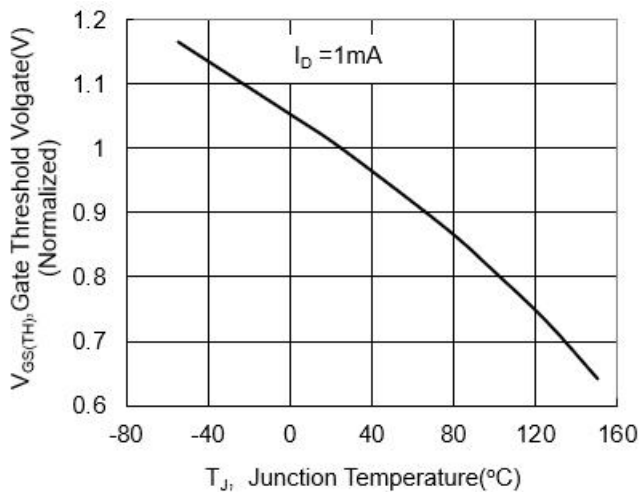
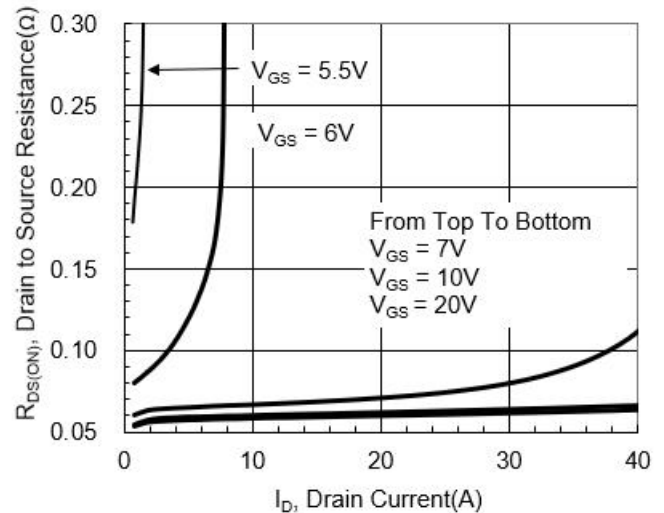
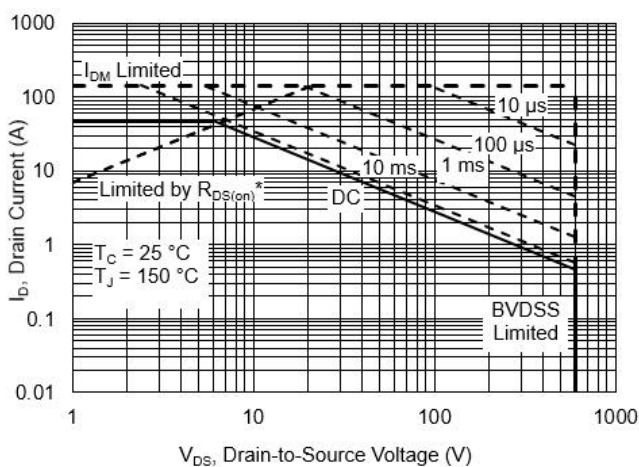
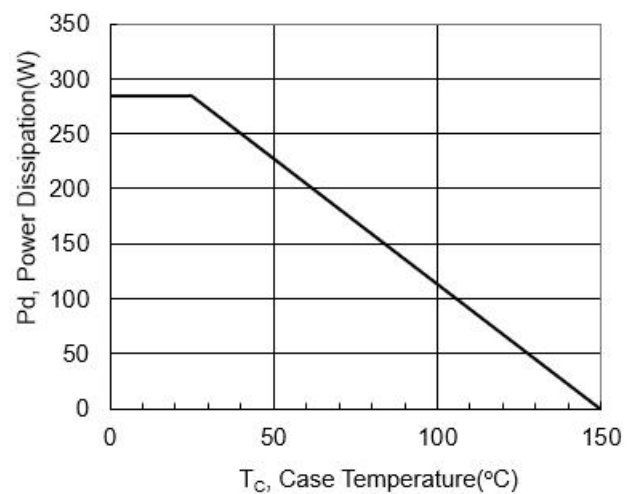
Fig 9 . $V_{GS(TH)}$ vs junction temperatureFig 10. Drain-source on-state resistance
 $T_J = 25^\circ\text{C}$ Fig 11. Safe operating area(TO-247)
 $T_C = 25^\circ\text{C}$ 

Fig 12 . Power dissipation

特征曲线 ELECTRICAL CHARACTERISTICS

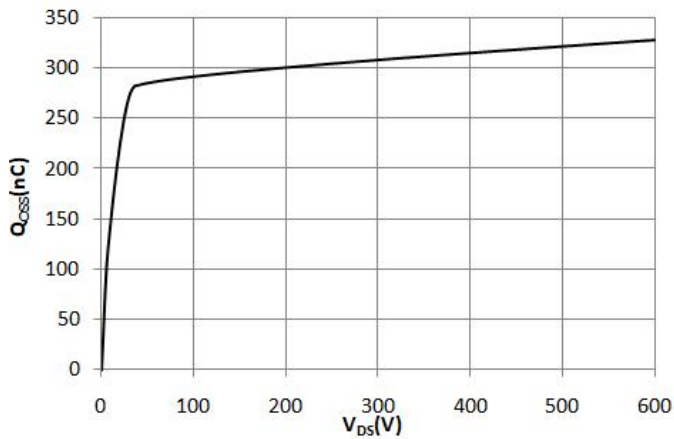


Fig 13 . QOSS vs Drain-Source Voltage

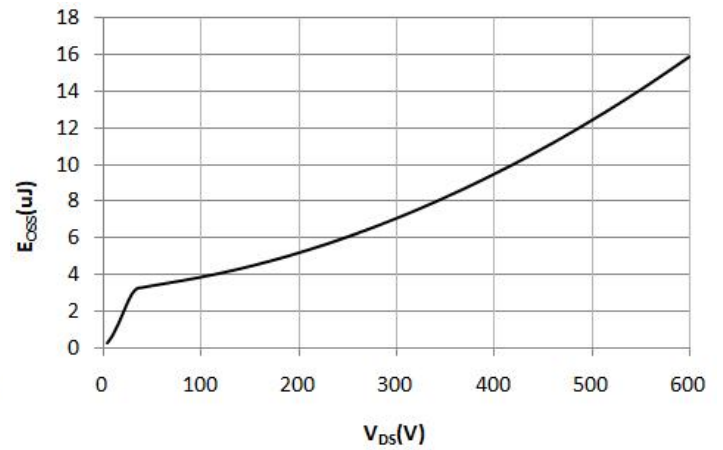


Fig 14 . EOSS vs Drain-Source Voltage

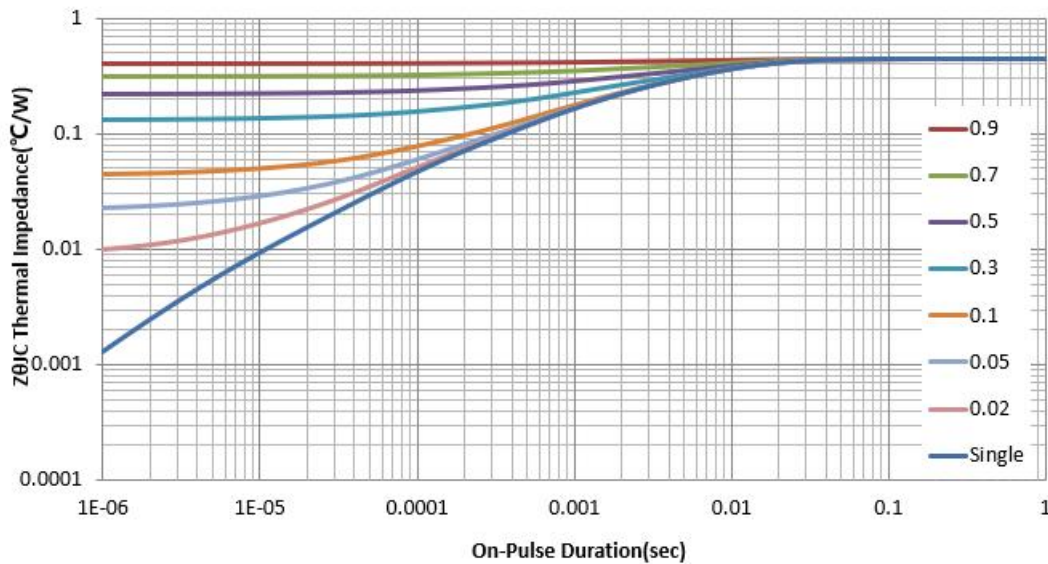
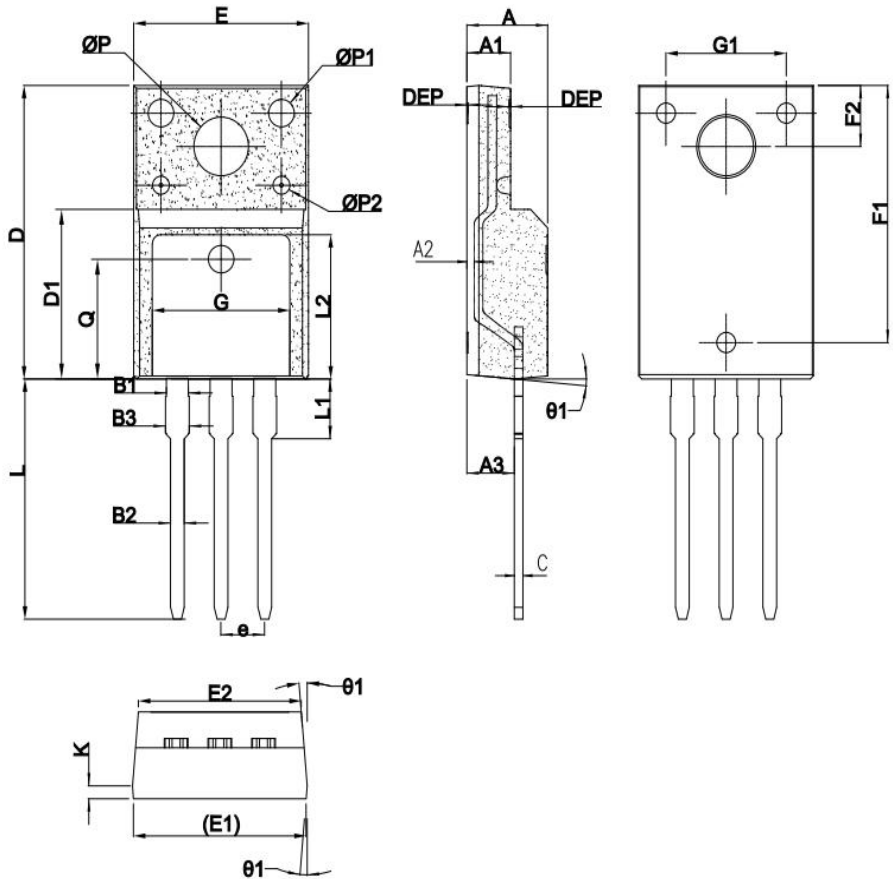


Fig 15. Transient thermal impedance

外形尺寸 PACKAGE MECHANICAL DATA

TO-220F



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
*A	4.50	4.70	4.90
*A1	2.34	2.54	2.74
*A2	0.38	0.43	0.48
*A3	2.66	2.76	2.86
B1	1.23	1.28	1.33
*B2	0.75	0.80	0.85
*B3	1.28	-	1.43
*C	0.45	0.50	0.60
*D	15.67	15.87	16.07
*D1	9.04	9.12	9.20
*e	2.49	2.54	2.59
*E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
F1	13.80	13.90	14.00
*F2	3.20	3.30	3.40
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
K	0.65	0.70	0.75
*L	12.78	12.98	13.18
*L1	3.13	3.23	3.33
L2	7.70	7.80	7.90
Q	6.5REF		
*φP	3.08	-	3.48
φP1	1.40	1.50	1.60
φP2	0.95	1.00	1.05
*θ1	3°	5°	7°
DEP	0.05	0.10	0.15

带*为检验尺寸