

**描述 / Descriptions**

TO-220FL 塑封封装 N 沟道 MOS 场效应管。N-CHANNEL MOSFET in a TO-220FL Plastic Package.

**特征 / Features**

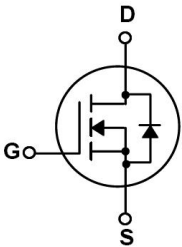
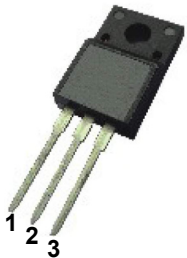
600V 超结功率场效应管,  $R_{DS(on)} \times Q_g$  很低, 100%雪崩测试, 符合 RoHS 要求。

600V Super-Junction Power MOSFET. Very Low  $R_{DS(on)} \times Q_g$ , 100%avalanche tested, RoHS compliant.

**用途 / Applications**

用于开关电源、不间断电源、功率因数校正。

Switch Mode Power Supply, Uninterruptible Power Supply, Power Factor Corrections.

**内部等效电路 / Equivalent Circuit****引脚排列 / Pinning**

PIN 1 : G

PIN 2 : D

PIN 3 : S

**放大及印章代码 /  $h_{FE}$  Classifications & Marking**

见印章说明。 See Marking Instructions.

**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage	$V_{DSS}$	600	V
Drain Current	$I_D$	5	A
Drain Current - Pulsed <sup>(note1)</sup>	$I_{DM}^{(note1)}$	20	A
Gate-Source Voltage	$V_{GS}$	±30	V
Single Pulsed Avalanche Energy <sup>(note2)</sup>	$E_{AS}^{(note2)}$	67.5	mJ
Repetitive Avalanche Energy <sup>(note1)</sup>	$E_{AR}^{(note1)}$	34	mJ
Avalanche Current <sup>(note1)</sup>	$I_{AR}^{(note1)}$	1	A
Power Dissipation	$P_D$	35	W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.6	°C/W
Junction and Storage Temperature Range	$T_j$ $T_{stg}$	-55~150	°C

**电性能参数 / Electrical Characteristics(Ta=25°C)**

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Drain-Source Breakdown Voltage	$V_{DSS}$	$V_{GS}=0V$ $I_D=250\mu A$	600			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=600V$ $V_{GS}=0V$ $T_J=25^\circ C$			1.0	$\mu A$
		$V_{DS}=480V$ $V_{GS}=0V$ $T_J=150^\circ C$			10	
Gate-Body Leakage Current Forward	$I_{GSS}$	$V_{GS}=\pm 30V$ $V_{DS}=0V$			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	2.5		4.5	V
Forward Transconductance <sup>(note3)</sup>	$g_{fs}$	$V_{DS}=40V$ $I_D=2.5A$		8		S
Static Drain-Source On-Resistance <sup>(note3)</sup>	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=2.5A$		0.77	0.85	$\Omega$
Drain-Source Diode Forward Voltage	$V_{SD}$	$T_J=25^\circ C$ $I_{SD}=3A$ $V_{GS}=0V$			1.5	V
Input Capacitance	$C_{iss}$	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0MHz$		320		$\mu F$
Output Capacitance	$C_{oss}$			75		
Reverse Transfer Capacitance	$C_{rss}$			4		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V$ $I_D=3A$ $R_G=25\Omega$		18		ns
Turn-On Rise Time	$t_r$			40		
Turn-Off Delay Time	$t_{d(off)}$			50		
Turn-Off Fall Time	$t_f$			30		

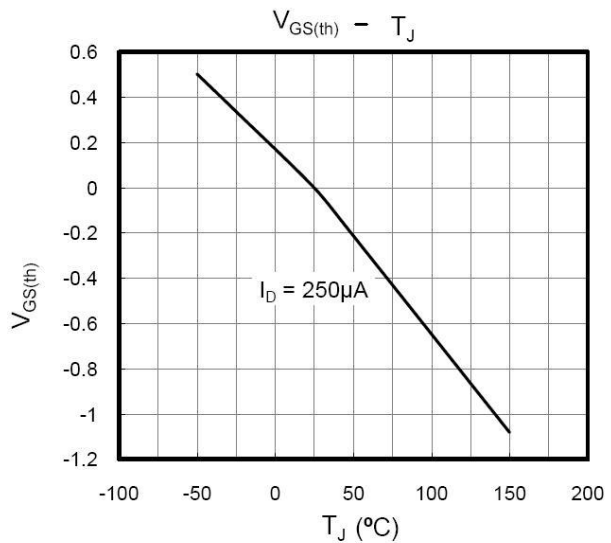
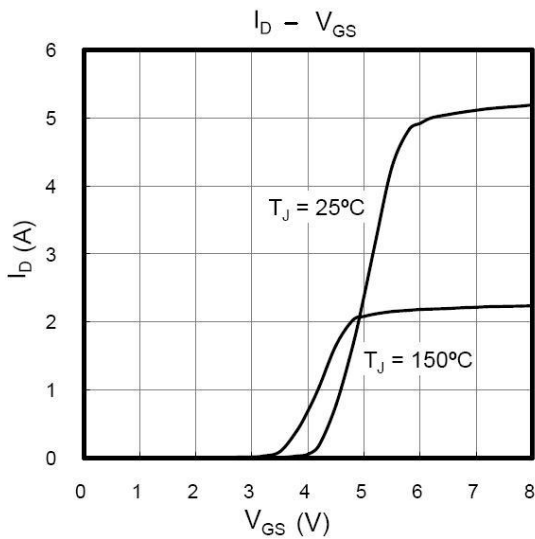
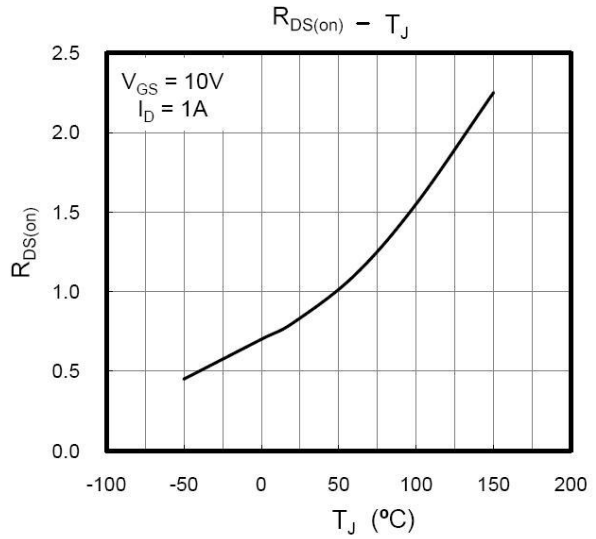
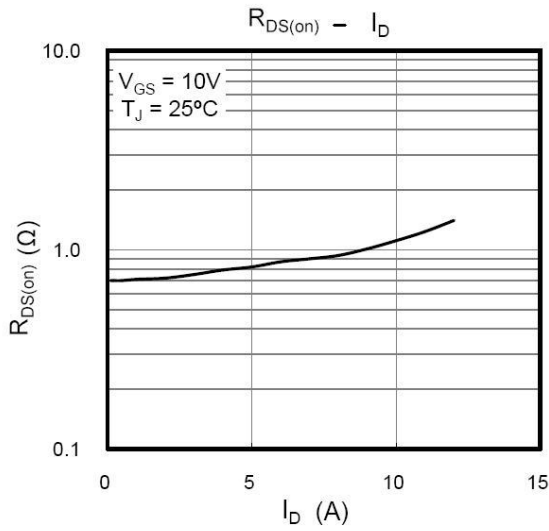
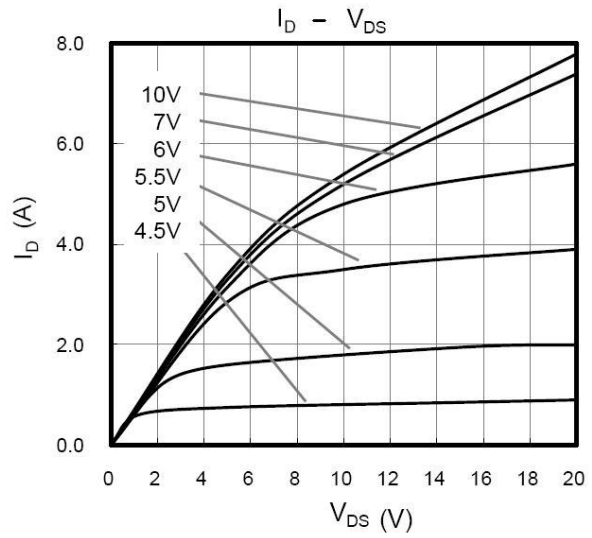
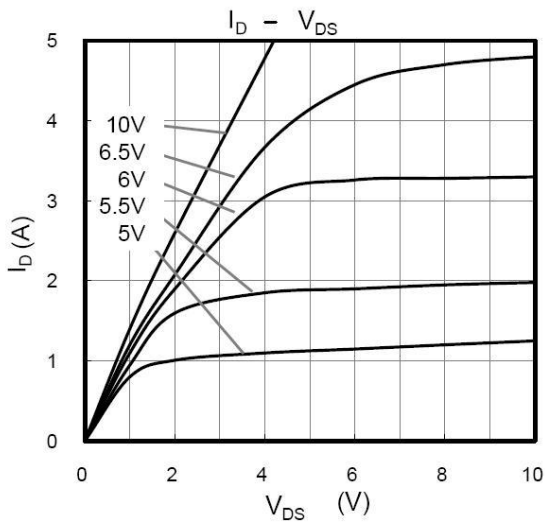
## 电性能参数 / Electrical Characteristics(Ta=25°C)

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Total Gate Charge	$Q_g$	$V_{DD}=480V$ $I_D=3A$ $V_{GS}=10V$		15		nC
Gate-Source Charge	$Q_{gs}$			3		
Gate-Drain Charge	$Q_{gd}$			6		
Continuous Source Current	$I_S$	$T_C=25^\circ C$			5	A
Pulsed Source Current	$I_{SM}$				20	
Reverse Recovery Time	$t_{rr}$	$V_R=480V$ $I_F=I_S$ $di_F/dt=100A/\mu S$		180		ns
Reverse Recovery Charge	$Q_{rr}$			2.5		$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$			10		A
Total Gate Charge	$Q_g$				15	

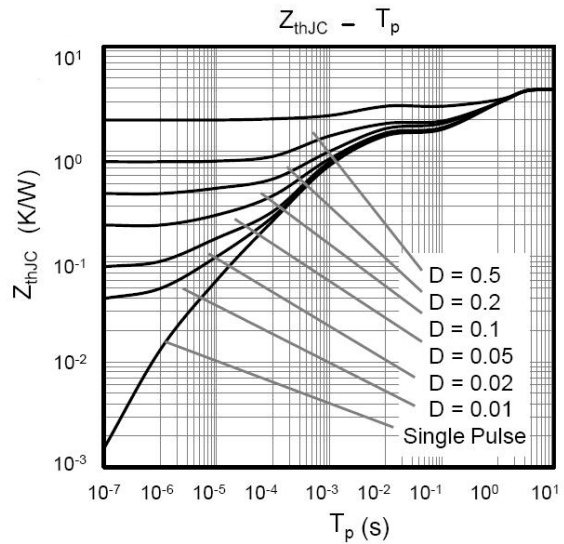
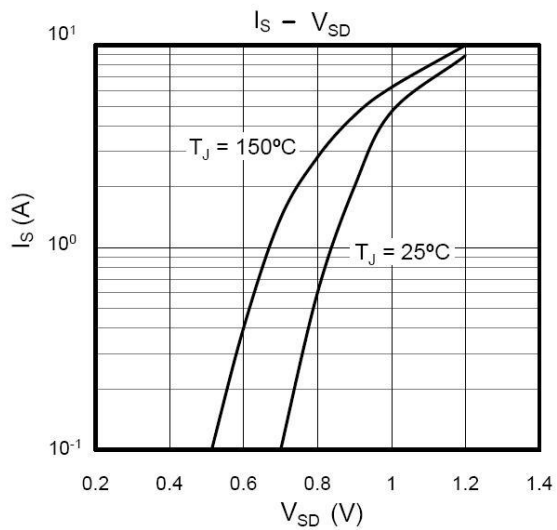
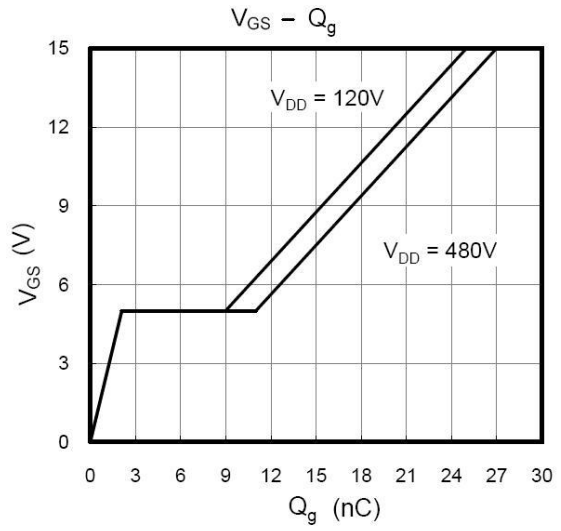
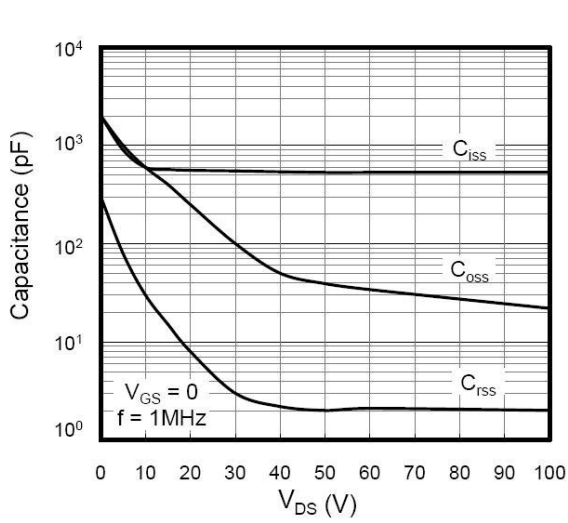
## 注释/Notes

- 脉冲宽度由最高结温限制  
Repetitive Rating: Pulse width limited by maximum junction temperature
- $L=60mH$ ,  $I_{AS}=1.5A$ ,  $V_{DD}=150V$ , 起始温度  $T_J=25^\circ C$   
 $L=60mH$ ,  $I_{AS}=1.5A$ ,  $V_{DD}=150V$ , Starting  $T_J=25^\circ C$
- 脉冲测试: 脉冲宽度 $\leq 300\mu s$ , 占空比 $\leq 1\%$   
Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle $\leq 1\%$

电参数曲线图 / Electrical Characteristic Curve

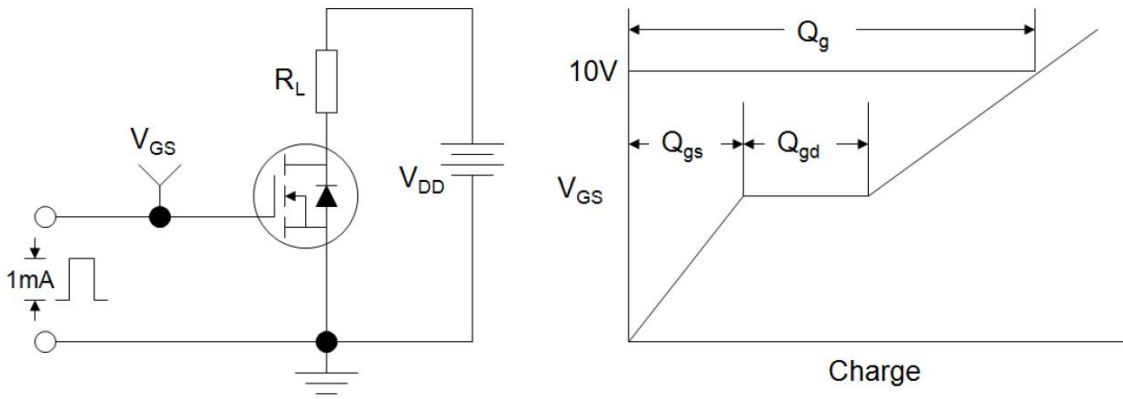


电参数曲线图 / Electrical Characteristic Curve

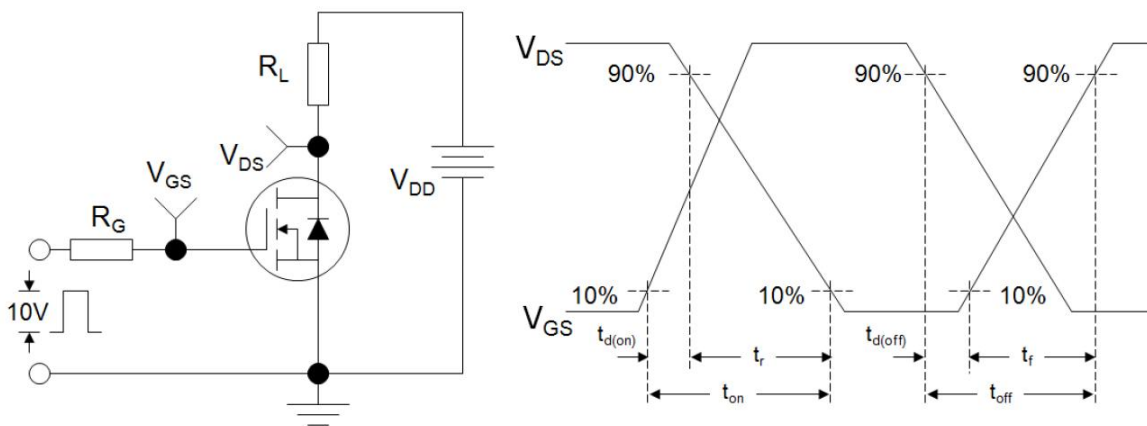


**测试电路和波形 / Test Circuit and Waveform**

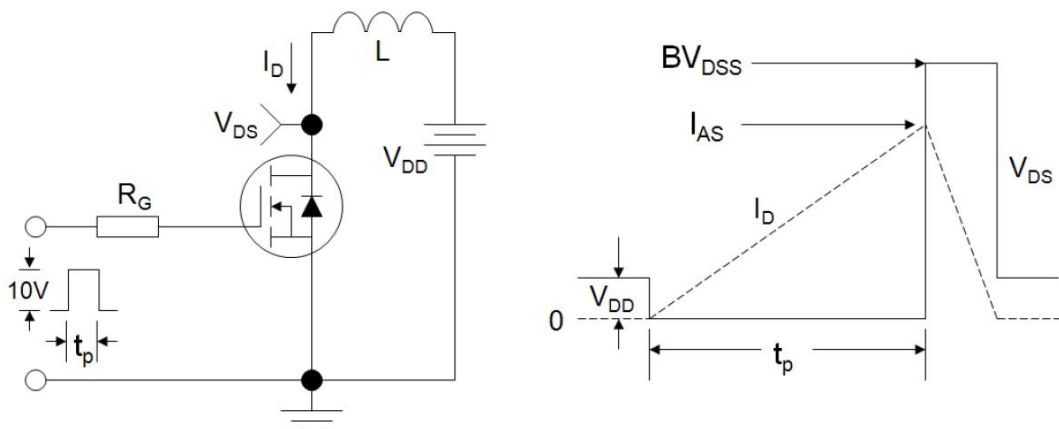
**Figure A: Gate Charge Test Circuit and Waveform**



**Figure B: Resistive Switching Test Circuit and Waveform**



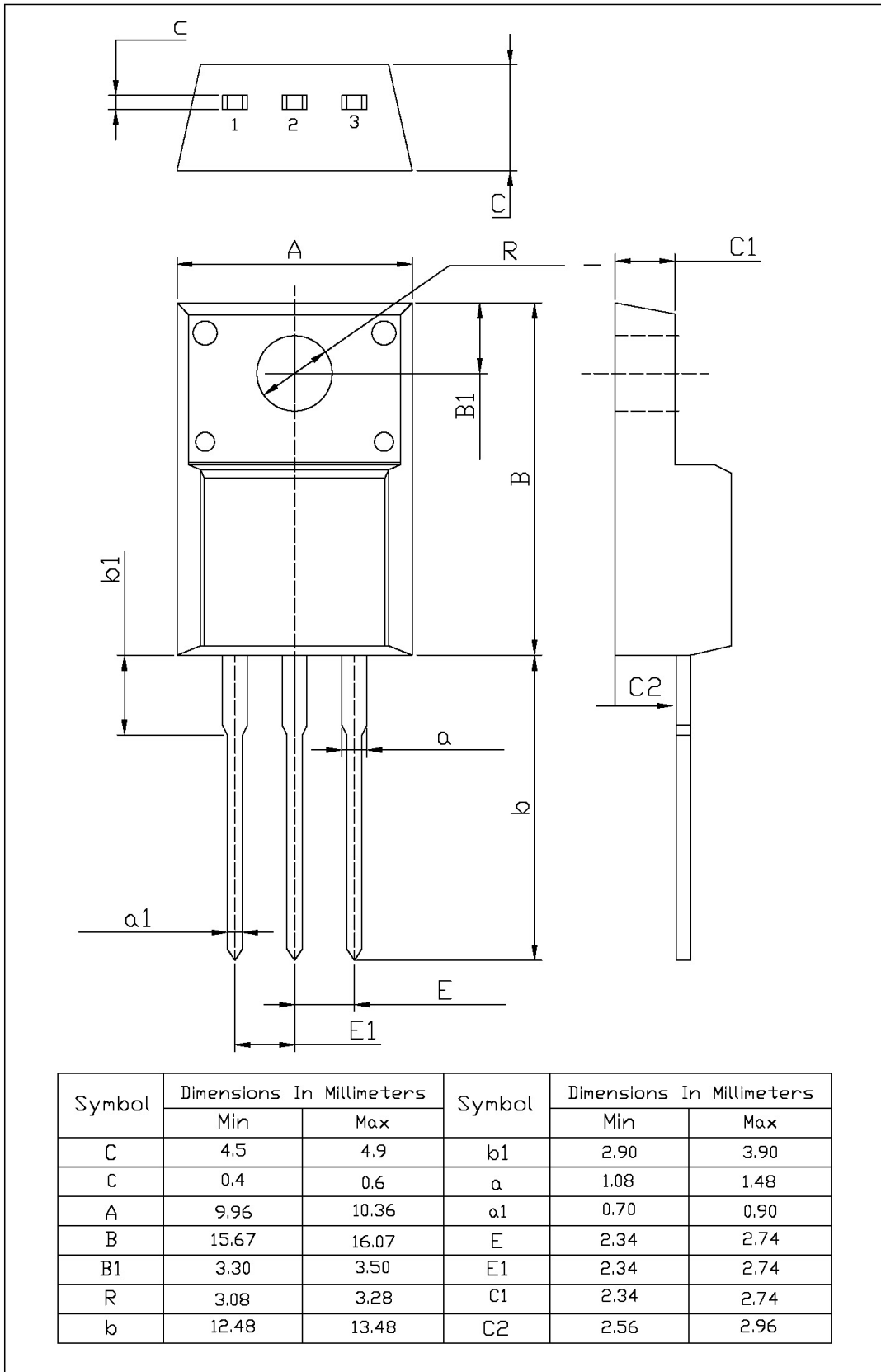
**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**



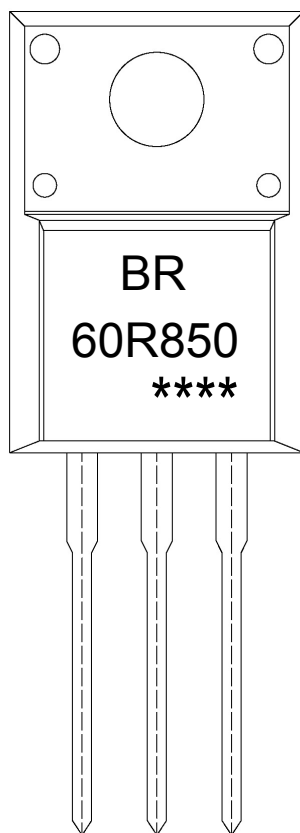
外形尺寸图 / Package Dimensions

TO-220FL

单位: mm



**印章说明 / Marking Instructions**



说明：

BR： 为公司代码

60R850： 为型号代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

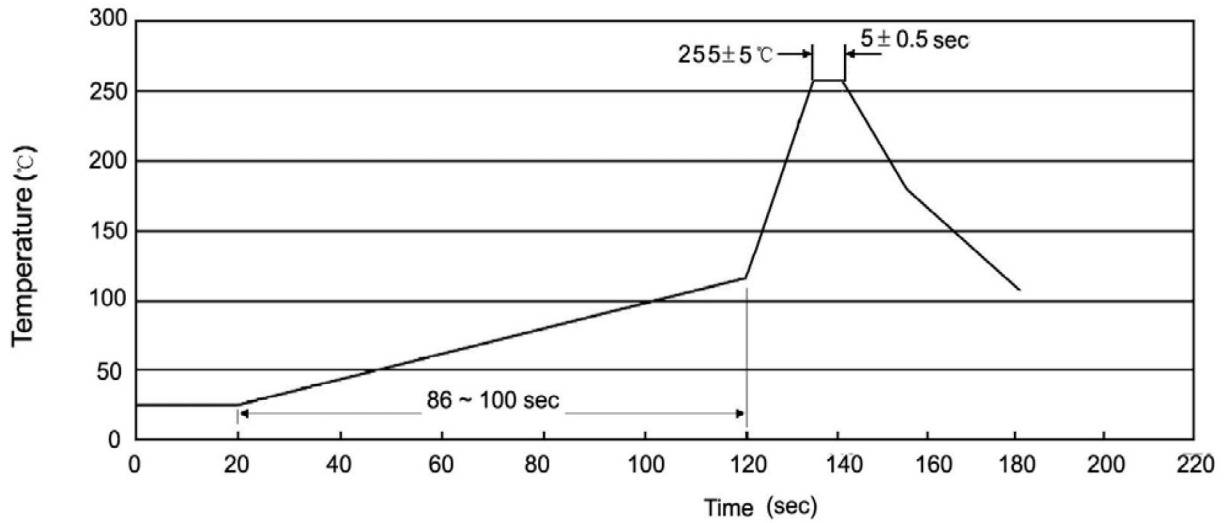
BR: Company Code.

60R850: Product Type.

\*\*\*\*: Lot No. Code, code change with Lot No.



**波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)**



说明：

- 1、预热温度 25 ~ 150°C，时间 60 ~ 90sec;
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2 ~ 10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

**耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions**

温度：270±5°C

时间：10±1 sec.

Temp.:270±5°C

Time:10±1 sec

**包装规格 / Packaging SPEC.**

套管包装 / TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm <sup>3</sup> )		
	Units/Tube 只/套管	Tubes/Inner Box 套管/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Tube 套管	Inner Box 盒	Outer Box 箱
TO-220FL	50	20	1,000	5	5,000	532×33×7.0	555×164×50	575×290×180

**使用说明 / Notices**