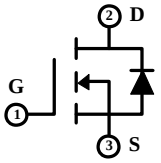
# 85A 80V N-channel Enhancement Mode Power MOSFET

## 1 Description

These N-channel enhancement mode power MOSFETS Used advanced trench technology design, provided excellent RDSON and low gate charge. Which accords with the RoHS standard.




$V_{DS}$ = 80V

$R_{DS(on)}$ (Type)= 6.5mΩ

$I_D$ = 85A


**TO-220C**

## 2 Features

- Low On Resistance
- Low Gate Charge
- High avalanche Current
- Fast Switching
- Low Reverse Transfer Capacitances
- 100% Single Pulse Avalanche Energy Test
- 100% $\Delta V_{DS}$ Test

## 3 Applications

- Power switching applications
- DC-DC converters
- UPS power supply

## 4 Electrical Characteristics

**4.1 Absolute Maximum Ratings** (Tc=25℃,unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 80 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±25 | V |
| Drain Current(continuous)(3) | | $I_D$ | 85 | A |
| Drain Current(continuous)(T=100℃)(3) | | $I_D$(100℃) | 70 | A |
| Drain Current(Pulsed)(4) | | $I_{DM}$ | 340 | A |
| Avalanche Current(5) | | $I_{AS}$ | 20 | A |
| Single Pulse Avalanche Energy(5) | | $E_{AS}$ | 410 | mJ |
| Maximum Power Dissipation | $T_a$=25℃ | $P_D$ | 2 | W |
| | $T_c$=25℃ | $P_D$ | 240 | W |
| Operating Junction Temperature Range | | $T_J$ | -55～175 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -55～175 | ℃ |
| High Temperature(tin solder) | | $T_L$ | 300 | ℃ |

### 4.2 Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 0.63 | ℃/W |
| Thermal Resistance Junction-to-Ambient | $R_{\theta JA}$ | 75 | ℃/W |

### 4.3 Electrical Characteristics (Tc=25℃,unless otherwise noted)

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Off Characteristics** | | | | | | |
| Drain-source Breakdown Voltage | $V_{DSS}$ | $I_D$=250μA,$V_{GS}$=0V | 80 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=80V,$V_{GS}$=0V,$T_C$=25℃ | -- | -- | 1 | μA |
| | | $V_{DS}$=64V,$V_{GS}$=0V,$T_C$=125℃ | -- | -- | 100 | μA |
| Gate-to-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±25V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| **On Characteristics**(3) | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2 | 3 | 4 | V |
| Drain-Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=40A | -- | 6.5 | 7.8 | mΩ |
| Gate Resisitance | $R_G$ | $V_{DD}$=0V,$V_{GS}$=0V,f=1MHz | -- | 1.3 | -- | Ω |
| **Dynamic Characteristics**(4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V,$V_{DS}$=25V,f=1MHz | -- | 3110 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 445 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 270 | -- | |
| **Switching Characteristics**(4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $I_D$=40A, $V_{DS}$=40V, $V_{GS}$=10V, $R_{GEN}$=6.8Ω | -- | 20.4 | -- | nS |
| Turn-on Rise Time | $t_r$ | | -- | 63 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 67 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 43 | -- | |
| Total Gate Charge | $Q_g$ | $I_D$=40A,$V_{DS}$=40V,$V_{GS}$=10V | -- | 76 | -- | nC |
| Gate-to-Source Charge | $Q_{gs}$ | | -- | 9.5 | -- | |
| Gate-to-Drain(“Miller”)Charge | $Q_{gd}$ | | -- | 40 | -- | |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage(3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=85A | -- | -- | 1.3 | V |
| Diode Forward Current(2) | $I_S$ | | -- | -- | 85 | A |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25℃,$I_F$=40A, dI$_F$/dt=100A/μS,$V_{GS}$=0V | -- | 25 | -- | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | -- | 18.5 | -- | nC |

Notes:

1: Repetitive rating, pulse width limited by maximum junction temperature.

2: Surface mounted on FR4 Board, t≤10sec.

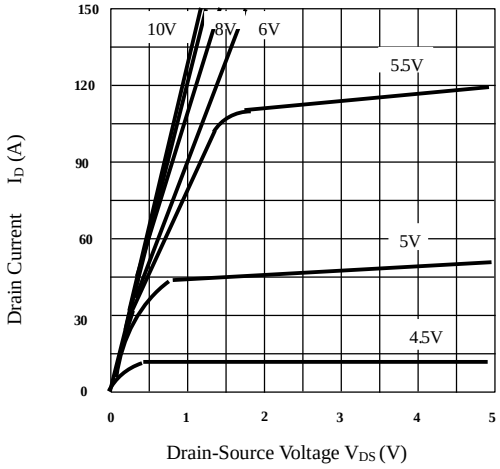
3: Pulse width ≤ 300μs, duty cycle ≤ 2%.

4: Guaranteed by design, not subject to production.

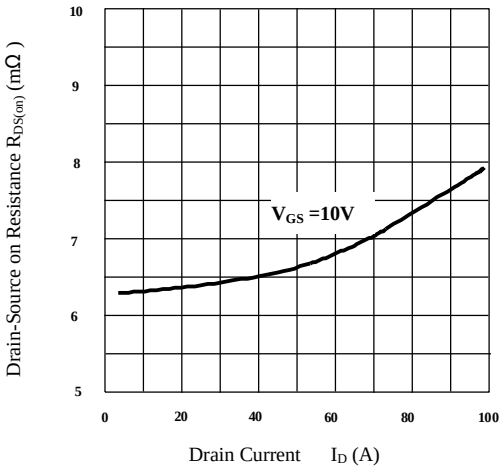
5: L=0.5mH,$I_D$=40.5A,$V_{DD}$=50V,$V_{GS}$=10V,Start $T_J$=25℃.

## 5 Typical characteristics diagrams

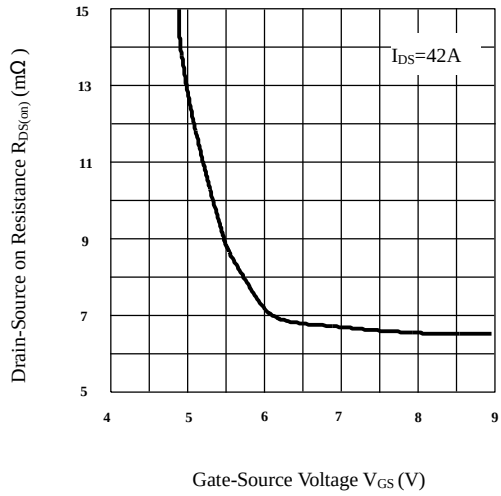
**Output Characteristics**



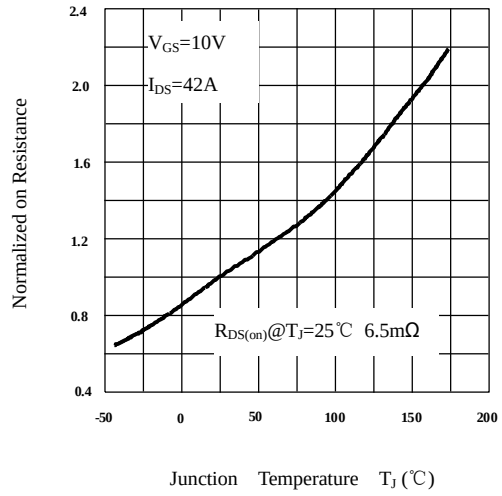

**Drain-Source On Resistance vs. $I_D$**



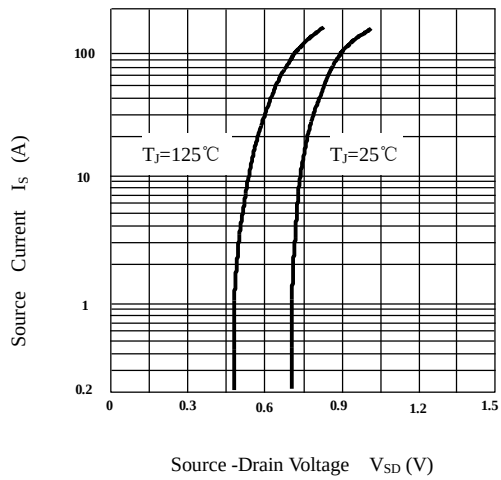

**Drain-Source On Resistance vs. $V_{GS}$**



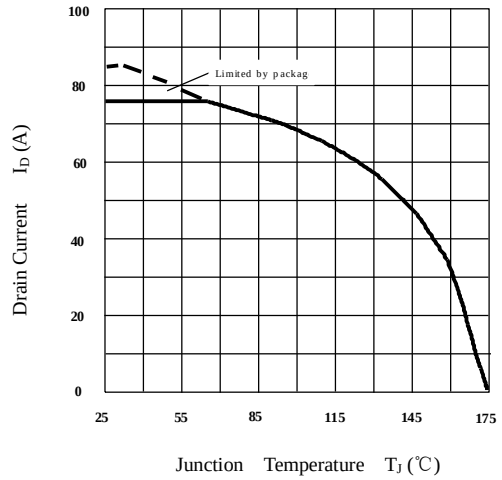

**Drain-Source On Resistance vs. $T_J$**




**Drain-Source Diode Forward**

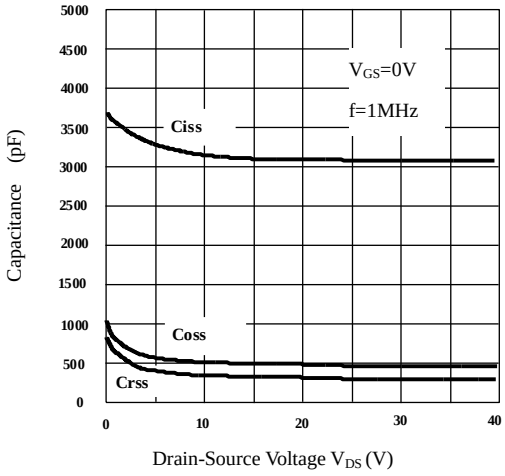



**Maximum Drain Current vs. $T_J$**

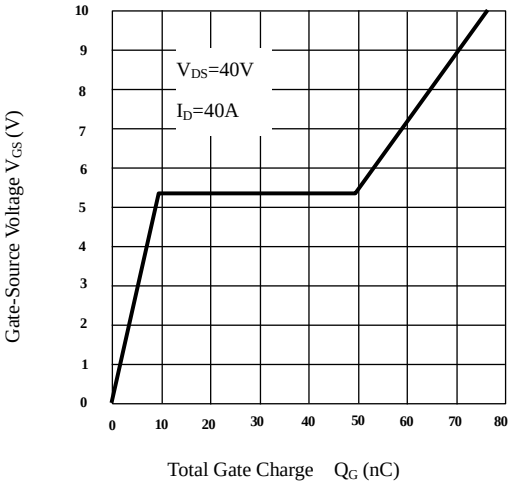


## 5 Typical characteristics diagrams(continues)

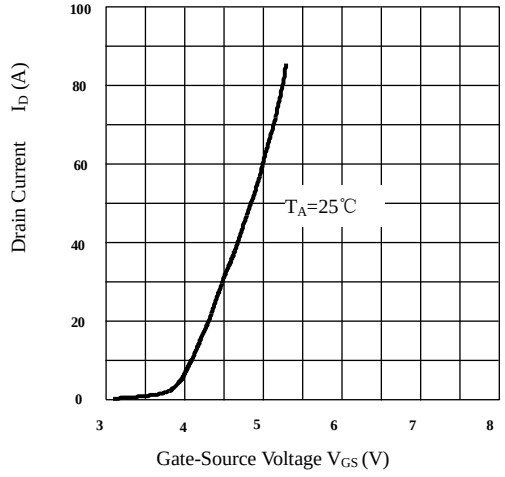
**Capacitance vs. $V_{DS}$**



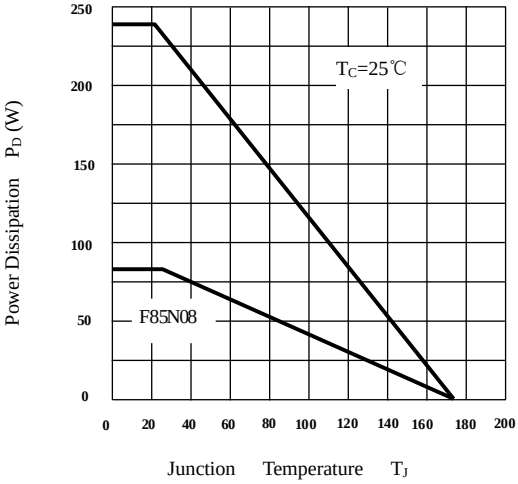

**Gate Charge Characteristics**



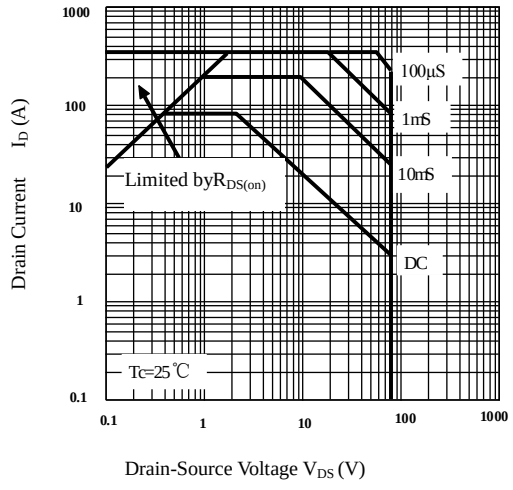

**Transfer Characteristics**



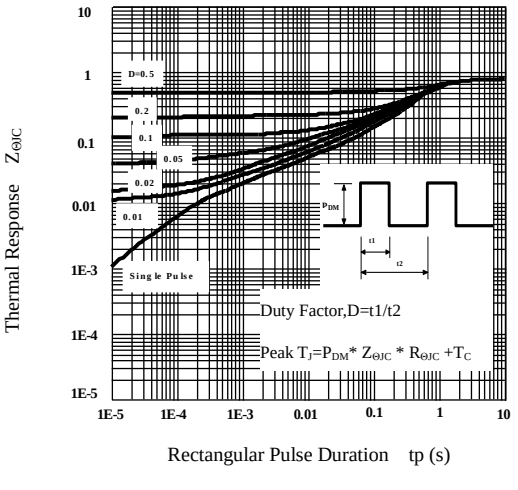

**Power Dissipation**



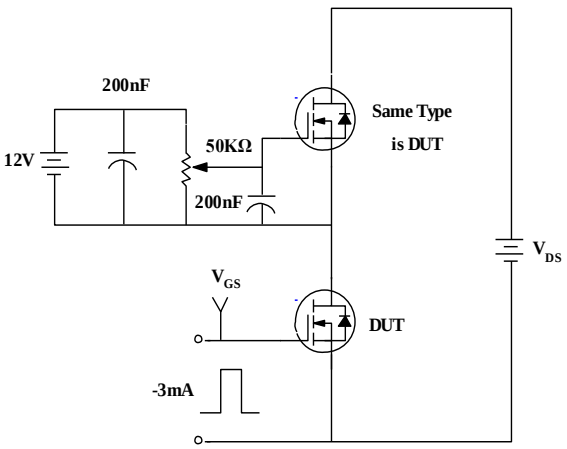

**Safe Operation Area**

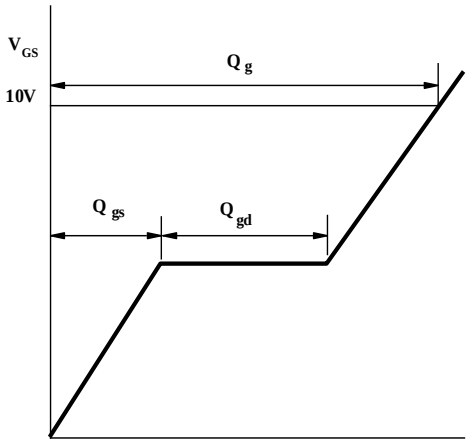



**Transient Thermal Response Curve**

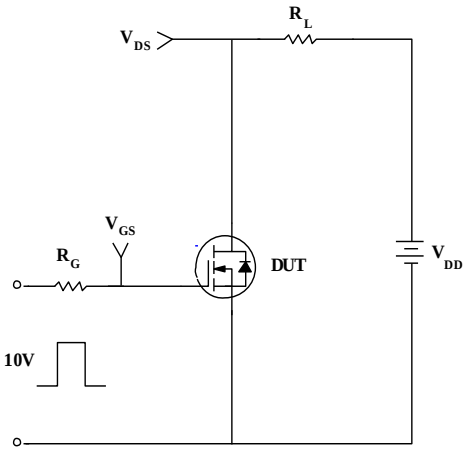


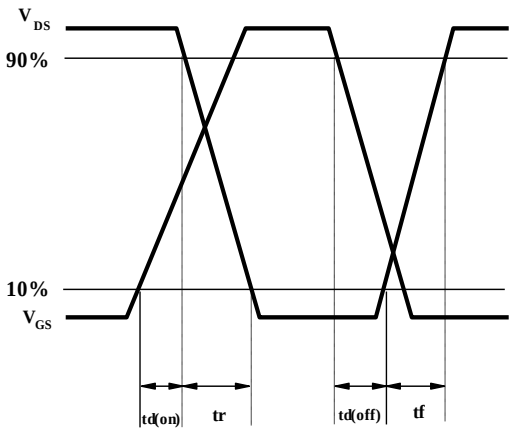
## 6 Typical Test Circuit and Waveform



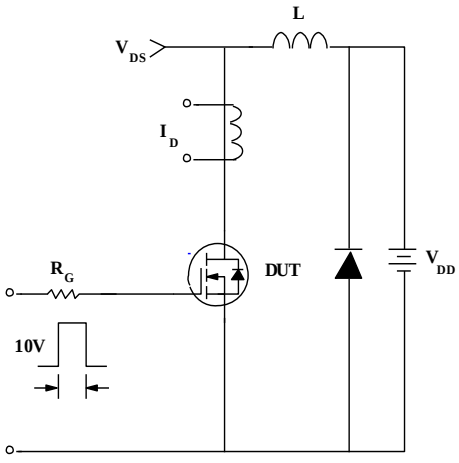



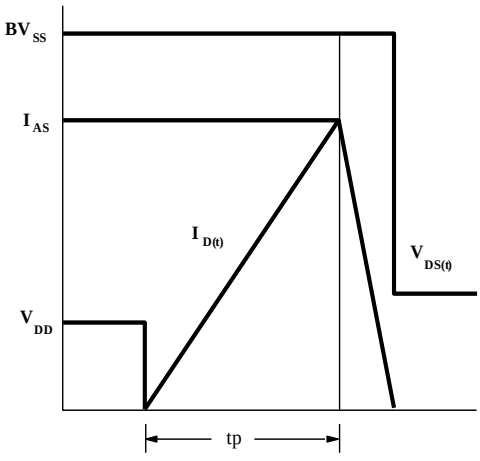

**1) Gate Charge Test Circuit & Waveform**



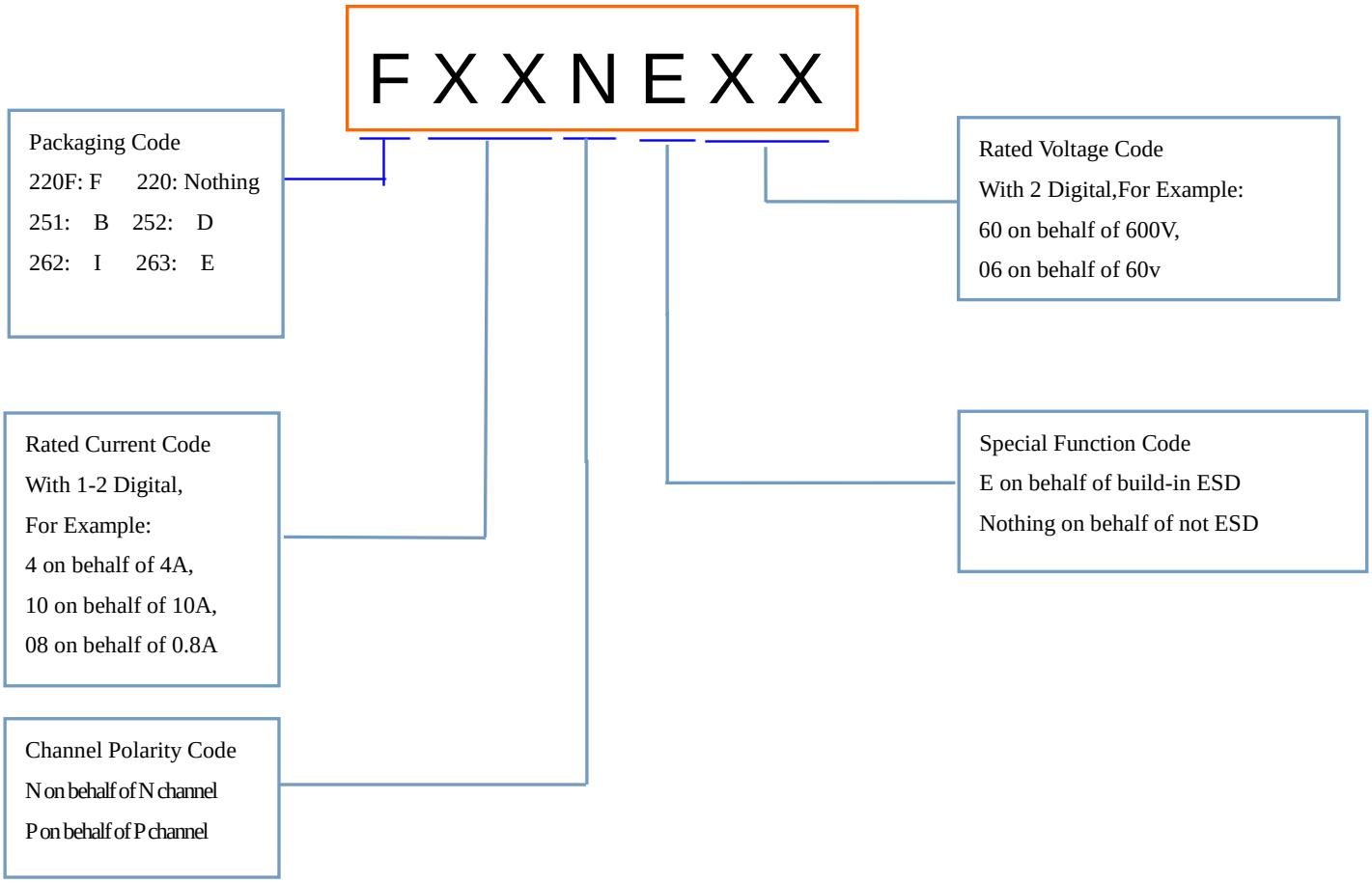

**2) Switching Test Circuit & Waveforms**




**3) Unclamped Inductive Test Circuit & Waveforms**

## 7 Product Names Rules

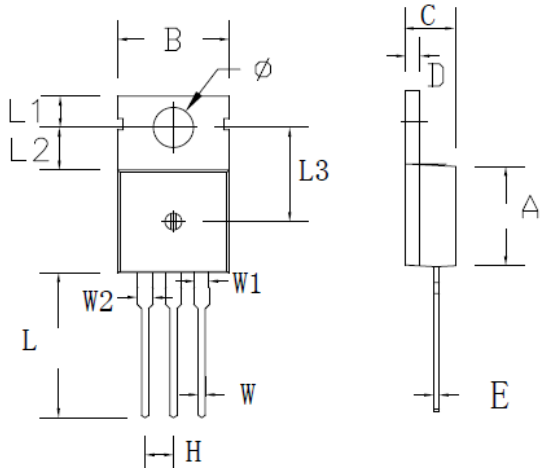



## 8 Product Specifications and Packaging Models

| Product Model | Package Type | Mark Name | RoHS | Package | Quantity |
|---|---|---|---|---|---|
| 85N08 | TO-220C | 85N08 | Pb-free | Tube | 1000/box |
| F85N08 | TO-220F | F85N08 | Pb-free | Tube | 1000/box |
| I85N08 | TO-262 | I85N08 | Pb-free | Tube | 1000/box |
| E85N08 | TO-263 | E85N08 | Pb-free | Tape & Reel | 800/box |

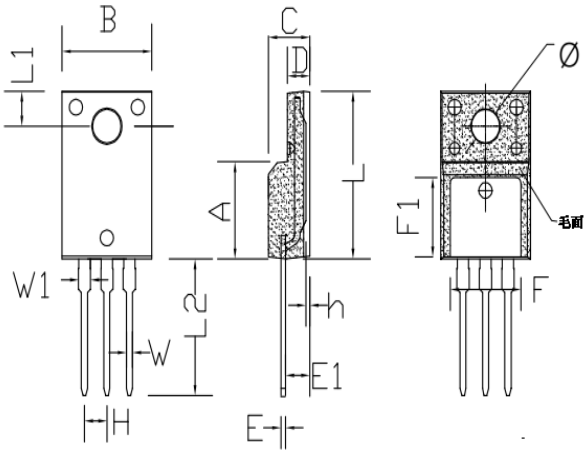
## 9 Dimensions

TO-220C PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 8.80 | 9.30 | 0.346 | 0.366 |
| B | 9.70 | 10.30 | 0.382 | 0.406 |
| C | 4.25 | 4.75 | 0.167 | 0.187 |
| D | 1.20 | 1.45 | 0.047 | 0.057 |
| E | 0.40 | 0.60 | 0.016 | 0.024 |
| H | 2.54 TYP | | 0.100 TYP | |
| W | 0.60 | 0.95 | 0.024 | 0.037 |
| W1 | 1.05 | 1.45 | 0.041 | 0.057 |
| W2 | 1.20 | 1.60 | 0.047 | 0.063 |
| L | 12.60 | 13.40 | 0.496 | 0.528 |
| L1 | 2.45 | 2.95 | 0.096 | 0.116 |
| L2 | 3.45 | 3.95 | 0.136 | 0.156 |
| L3 | 8.15 | 8.65 | 0.321 | 0.341 |
| Φ | 3.50 | 3.90 | 0.138 | 0.154 |

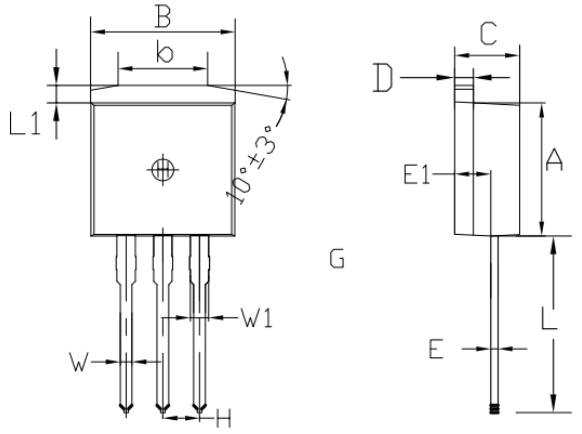
TO-220F PACKAGE OUTLINE DIMENSIONS




| Symbol | DimensionsIn Millimeters | | DimensionsIn Inches | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 8.80 | 9.30 | 0.346 | 0.366 |
| B | 10.00 | 10.50 | 0.394 | 0.413 |
| C | 4.30 | 4.90 | 0.169 | 0.193 |
| D | 2.30 | 2.70 | 0.091 | 0.106 |
| L | 15.55 | 16.15 | 0.612 | 0.636 |
| h | 0.40 | 0.60 | 0.016 | 0.024 |
| L1 | 3.15 | 3.55 | 0.124 | 0.140 |
| L2 | 12.65 | 13.35 | 0.498 | 0.526 |
| W | 0.70 | 0.90 | 0.028 | 0.035 |
| W1 | 1.15 | 1.55 | 0.045 | 0.061 |
| H | 2.54 TYP | | 0.100 TYP | |
| E | 0.48 | 0.53 | 0.019 | 0.021 |
| ϕ | 2.90 | 3.40 | 0.114 | 0.134 |
| E1 | 2.40 | 2.90 | 0.094 | 0.114 |
| F | 7.75 | 8.25 | 0.305 | 0.325 |
| F1 | 7.35 | 7.85 | 0.289 | 0.309 |

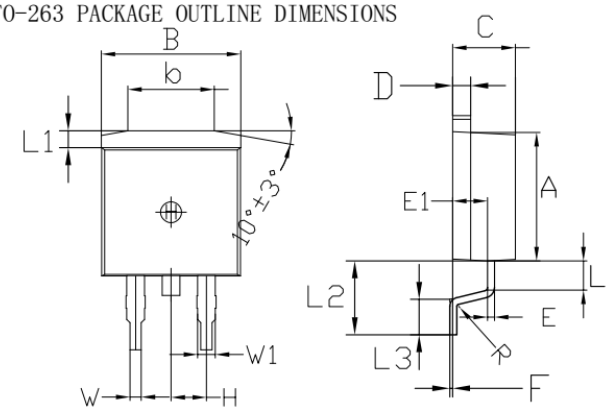
## 9 Dimensions(continues)

TO-262 PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 8.80 | 9.30 | 0.346 | 0.366 |
| B | 9.70 | 10.30 | 0.382 | 0.406 |
| C | 4.25 | 4.75 | 0.167 | 0.187 |
| D | 1.20 | 1.45 | 0.047 | 0.057 |
| E | 0.40 | 0.60 | 0.016 | 0.024 |
| L | 12.25 | 13.75 | 0.482 | 0.541 |
| L1 | 1.15 | 1.45 | 0.045 | 0.057 |
| E1 | 2.4 | 2.6 | 0.0945 | 0.1024 |
| W | 0.80 | 0.82 | 0.0315 | 0.034 |
| W1 | 1.20 | 1.30 | 0.047 | 0.051 |
| H | 2.54 TYP | | 0.200 TYP | |
| b | 5.50 | 6.50 | 0.216 | 0.256 |

TO-263 PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 8.80 | 9.30 | 0.346 | 0.366 |
| B | 9.70 | 10.30 | 0.382 | 0.406 |
| C | 4.25 | 4.75 | 0.167 | 0.187 |
| D | 1.20 | 1.45 | 0.047 | 0.057 |
| E | 0.40 | 0.60 | 0.016 | 0.024 |
| L | 1.90 | 2.30 | 0.075 | 0.091 |
| L1 | 1.15 | 1.45 | 0.045 | 0.057 |
| R | 0.24 | 0.26 | 0.0095 | 0.0102 |
| W | 0.80 | 0.82 | 0.0315 | 0.0323 |
| W1 | 1.20 | 1.30 | 0.047 | 0.051 |
| H | 2.54 TYP | | 0.200 TYP | |
| b | 5.50 | 6.50 | 0.216 | 0.256 |
| E1 | 2.4 | 2.6 | 0.0946 | 0.1024 |
| L2 | 5.20 | 5.80 | 0.205 | 0.228 |
| L3 | 2.20 | 3.20 | 0.087 | 0.126 |
| F | 0.03 | 0.23 | 0.0012 | 0.0091 |

## 10 Attentions

- ROUM Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Roma products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

## 11 Appendix

Revision history:

| Date | REV. | Description | Page |
|---|---|---|---|
| 2017.03.09 | 1.0 | Original | |