

SOT-89 Plastic-Encapsulate MOSFETS

Features

- $V_{DS}=-40V$
- $I_D=-8.5A$
- $R_{DS(on)}@V_{GS}=-10V < 32m\Omega$
- $R_{DS(on)}@V_{GS}=-4.5V < 40m\Omega$
- Avalanche energy tested
- Fast Switching Speedze
- Improved dv/dt capability, high ruggedness

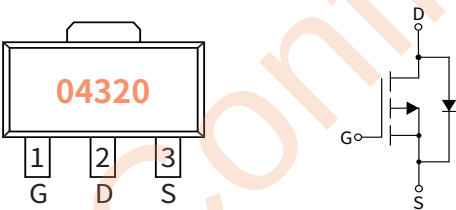
Applications

- Synchronous Rectification
- DC/DC Converter

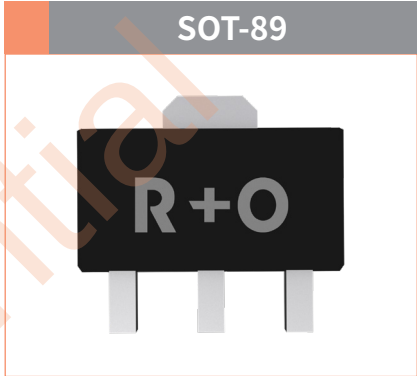
Mechanical Data

- Case: SOT-89  
Molding compound meets UL 94V-0 flammability rating, RoHS-compliant,halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750,Method 2026

Function Diagram



Drain-source Voltage  
-40 V  
Drain Current  
-8.5 Ampere



Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---------|--------------|----------------|-----------|----------|-------------|---------------|
| SOT-89  | R1           | 0.045          | 1000      | 10000    | 40000       | 7"            |

Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER                              | SYMBOL          | UNIT   | VALUE     |
|----------------------------------------|-----------------|--------|-----------|
| Drain-source Voltage                   | $V_{DS}$        | V      | -40       |
| Gate-source Voltage                    | $V_{GS}$        | V      | $\pm 20$  |
| Drain Current                          | $I_D$           | A      | -8.5      |
| Pulsed Drain Current <sup>(1)</sup>    | $I_{DM}$        | A      | -36       |
| Total Power Dissipation                | $P_D$           | W      | 3.1       |
| Junction temperature                   | $T_J$           | °C     | -55 ~+150 |
| Storage temperature                    | $T_{stg}$       | °C     | -55 ~+150 |
| Thermal Resistance Junction-to-Ambient | $R_{\theta JA}$ | °C / W | 40.3      |

### ● Static Parameter Characteristics (Tj=25°C Unless otherwise specified)

| PARAMETER                                        | SYMBOL       | Condition                      | UNIT       | Min  | Typ  | Max       |
|--------------------------------------------------|--------------|--------------------------------|------------|------|------|-----------|
| Drain-Source Breakdown Voltage                   | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$     | V          | -40  | —    | —         |
| Zero Gate Voltage Drain Current                  | $I_{DSS}$    | $V_{DS}=-40V, V_{GS}=0V$       | $\mu A$    | —    | —    | -1.0      |
| Gate-Body Leakage Current                        | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$    | nA         | —    | —    | $\pm 100$ |
| Gate Threshold Voltage                           | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | V          | -1.0 | -1.8 | -2.5      |
| Static Drain-Source On-Resistance <sup>(2)</sup> | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-6A$         | m $\Omega$ | —    | 25   | 32        |
|                                                  |              | $V_{GS}=-4.5V, I_D=-4A$        |            | —    | 30   | 40        |

### ● Dynamic Parameters

| PARAMETER                    | SYMBOL    | Condition                        | UNIT | Min | Typ  | Max |
|------------------------------|-----------|----------------------------------|------|-----|------|-----|
| Input Capacitance            | $C_{iss}$ | $V_{DS}=-20V, V_{GS}=0V, f=1MHz$ | pF   | —   | 1380 | —   |
| Output Capacitance           | $C_{oss}$ |                                  |      | —   | 130  | —   |
| Reverse Transfer Capacitance | $C_{rss}$ |                                  |      | —   | 115  | —   |

### ● Switching Parameters

| PARAMETER           | SYMBOL       | Condition                                            | UNIT | Min | Typ  | Max |
|---------------------|--------------|------------------------------------------------------|------|-----|------|-----|
| Turn-on Delay Time  | $t_{D(on)}$  | $V_{GS}=-10V, V_{DD}=-20V, I_D=-6A, R_{GEN}=3\Omega$ | nS   | —   | 5    | —   |
| Turn-on Rise Time   | $t_r$        |                                                      | nS   | —   | 19.5 | —   |
| Turn-off Delay Time | $t_{D(off)}$ |                                                      | nS   | —   | 75   | —   |
| Turn-off fall Time  | $t_f$        |                                                      | nS   | —   | 46   | —   |
| Total Gate Charge   | $Q_g$        | $V_{DS}=-20V, I_D=-6A, V_{GS}=-10V$                  | nC   | —   | 30   | —   |
| Gate-Source Charge  | $Q_{gs}$     |                                                      | nC   | —   | 4.4  | —   |
| Gate-Drain Charge   | $Q_{gd}$     |                                                      | nC   | —   | 5.6  | —   |

### ● Drian-Source Diode Characteristics

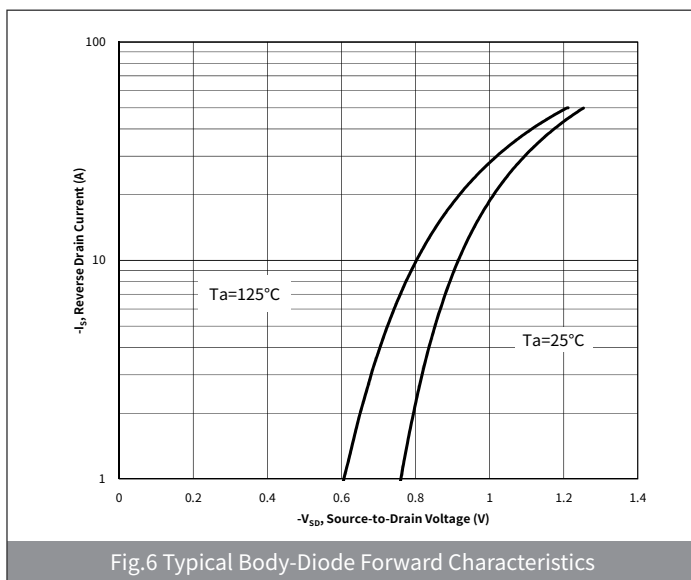
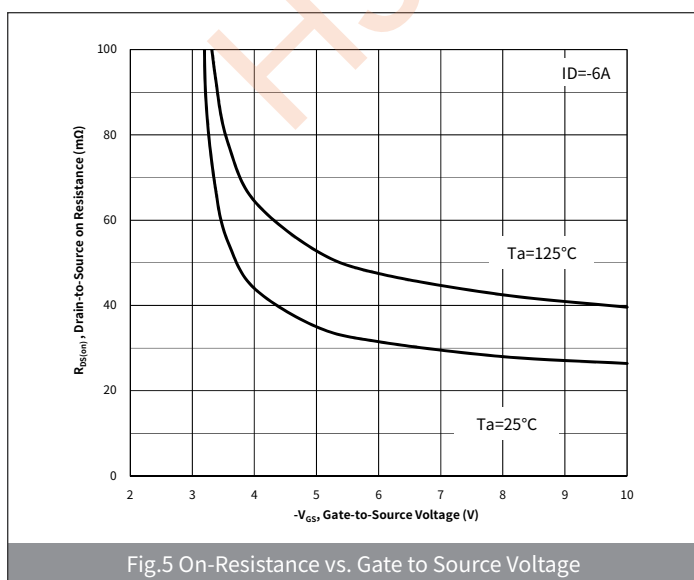
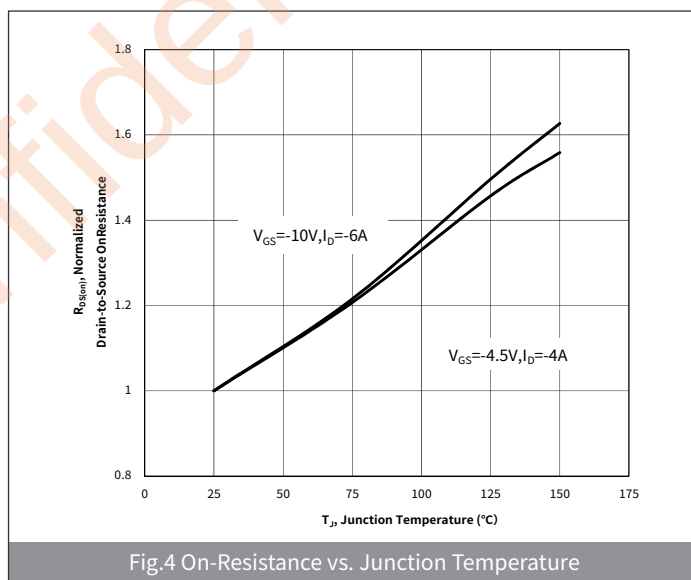
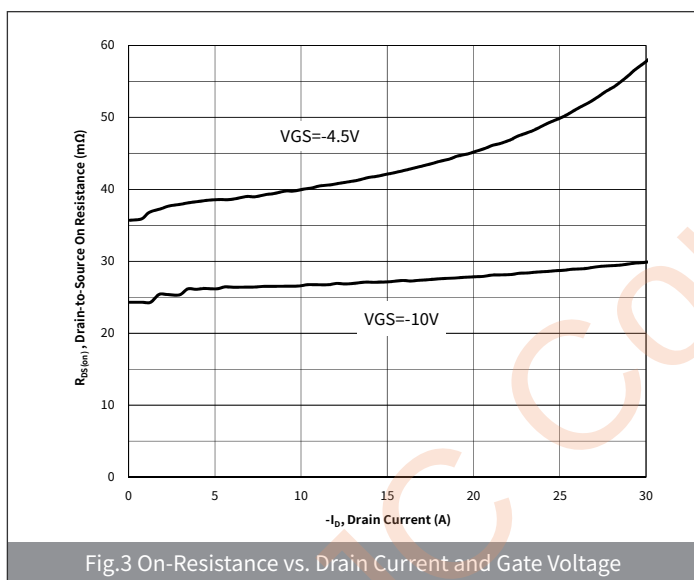
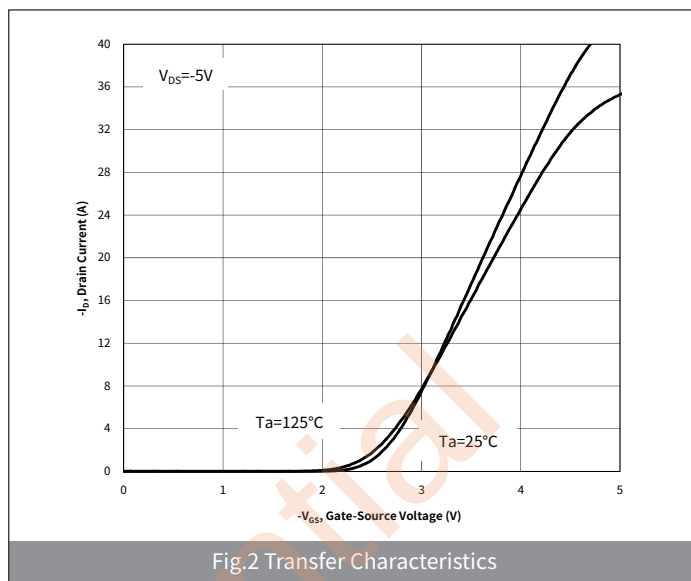
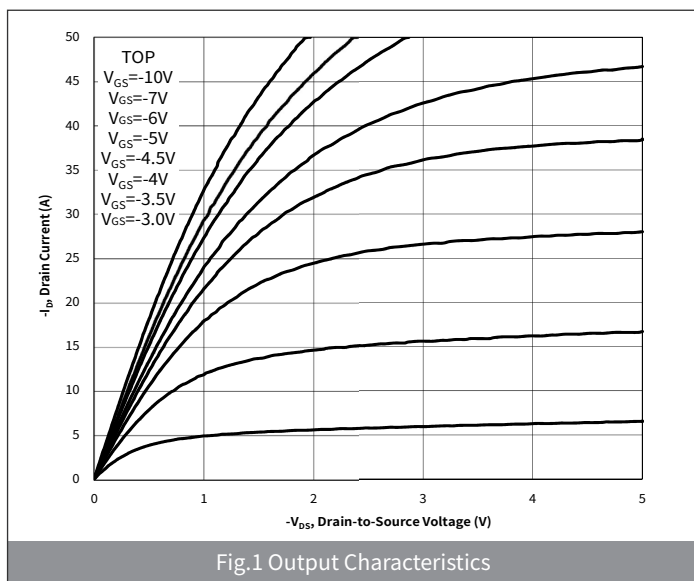
| PARAMETER                             | SYMBOL   | Condition              | UNIT | Min | Typ | Max |
|---------------------------------------|----------|------------------------|------|-----|-----|-----|
| Diode Forward Voltage                 | $V_{SD}$ | $I_S=-8.5A, V_{GS}=0V$ | V    | —   | —   | 1.2 |
| Maximum Body-Diode Continuous Current | $I_S$    | —                      | A    | —   | —   | 8.5 |

Note :

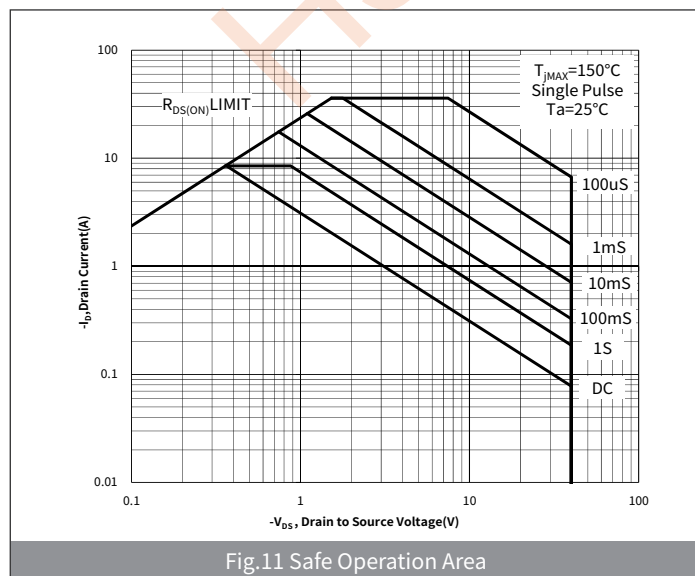
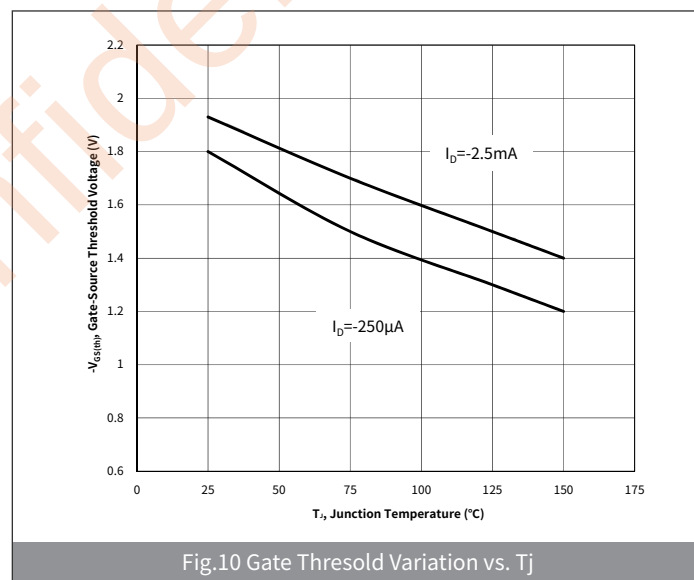
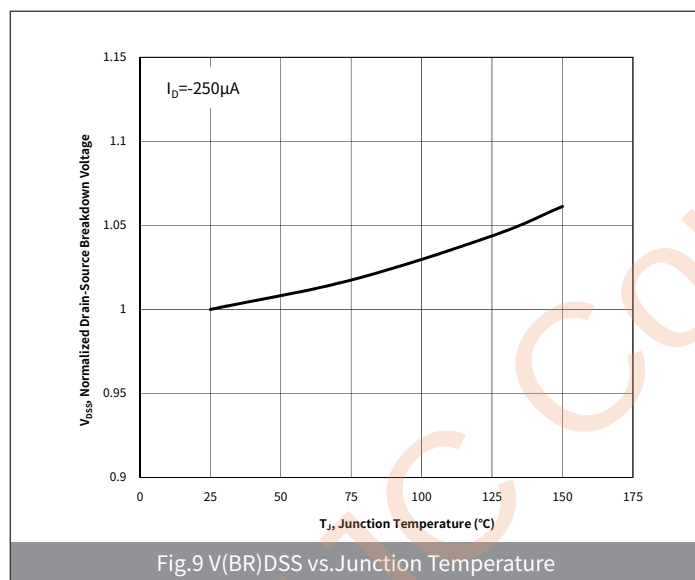
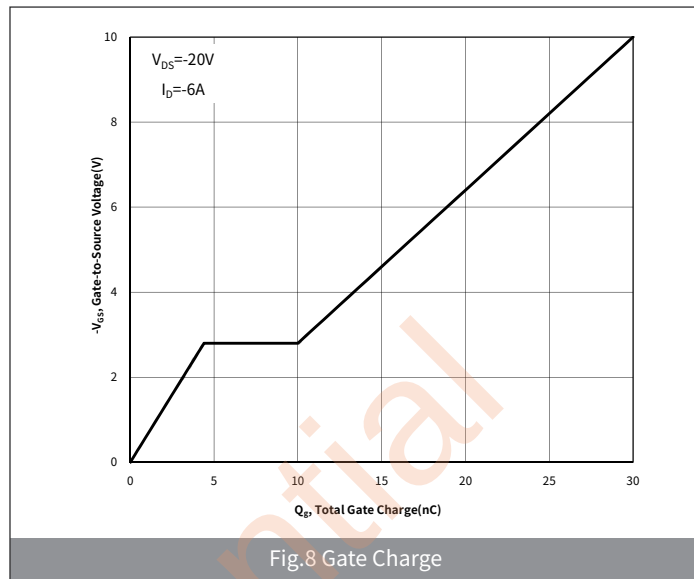
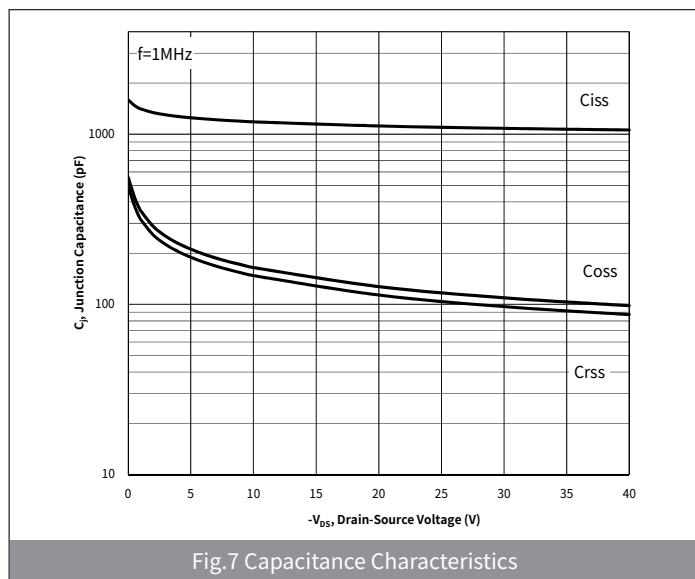
(1) Repetitive Rating: Pulse width limited by maximum junction temperature.

(2) Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

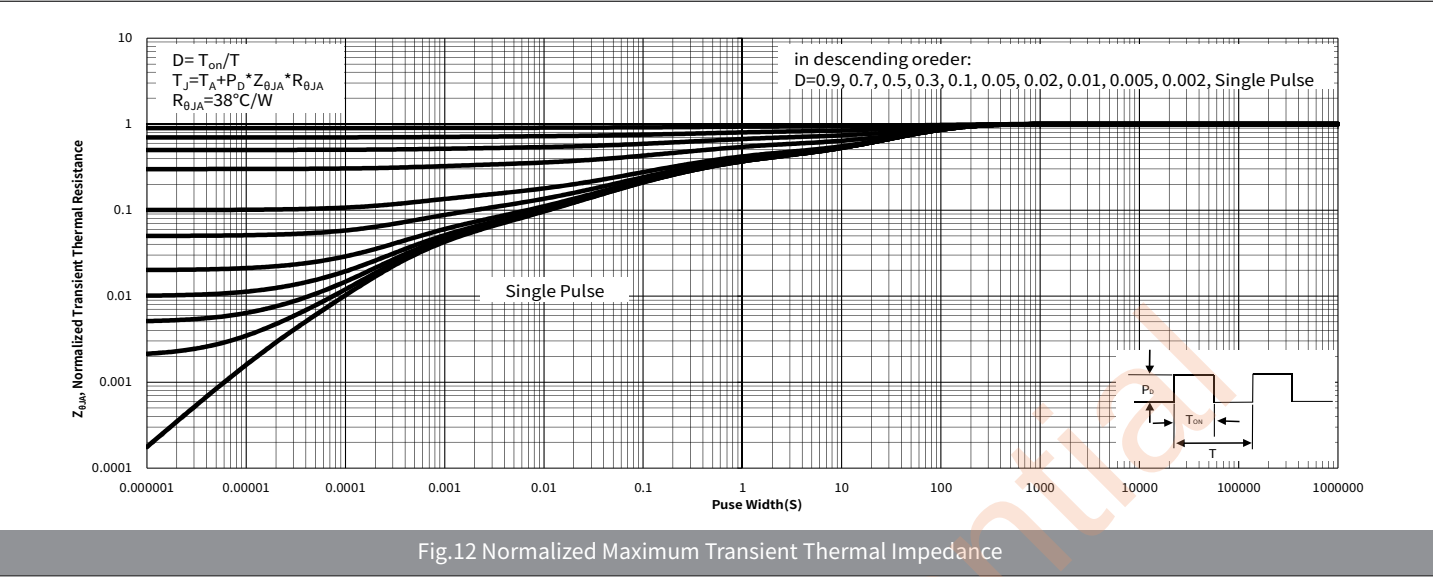
## ● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



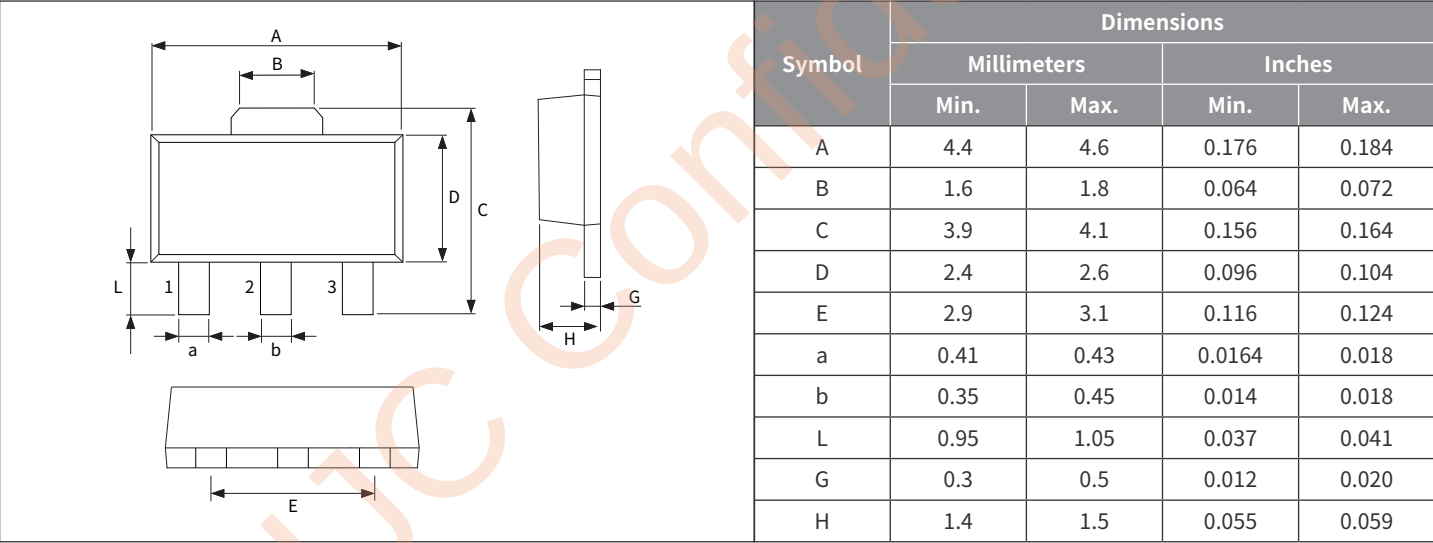
● **Ratings And Characteristics Curves** ( $T_a=25^\circ\text{C}$  Unless otherwise specified)



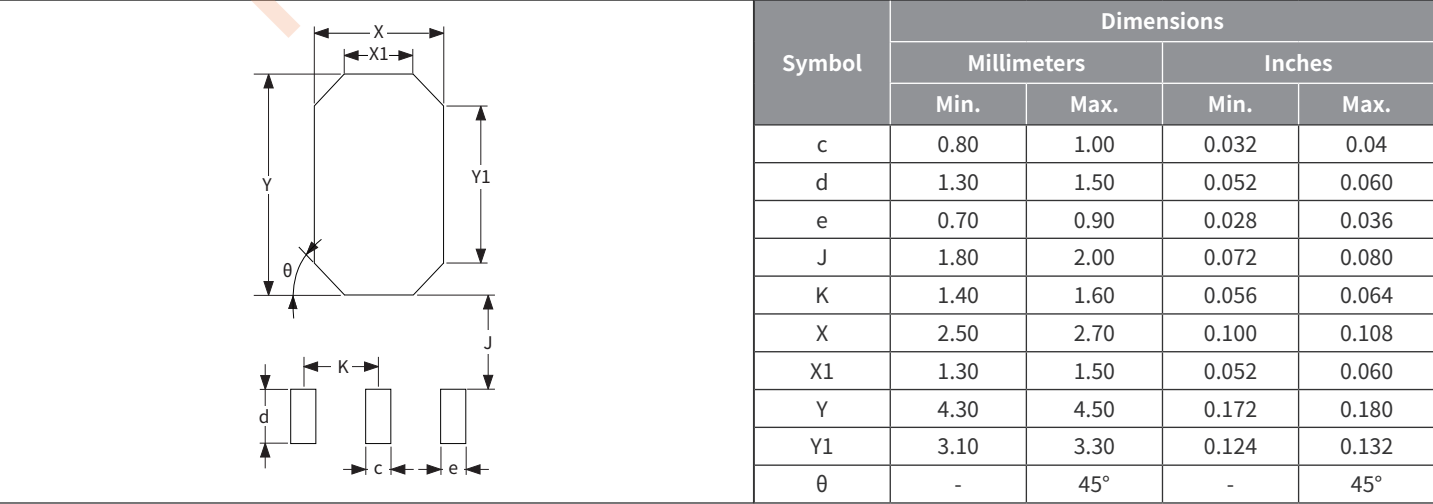
● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



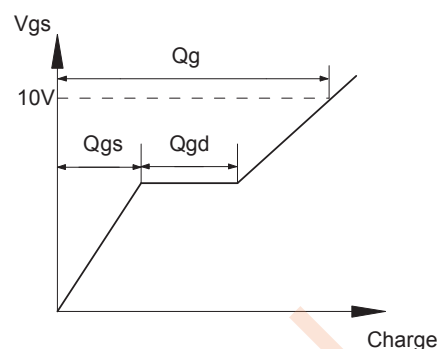
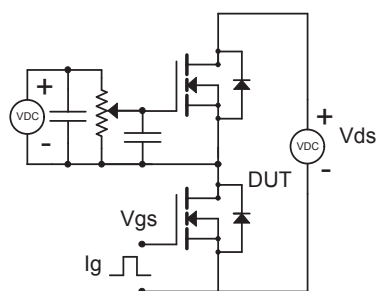
● Package Outline Dimensions (SOT-89)



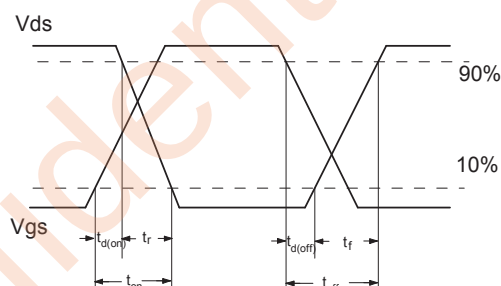
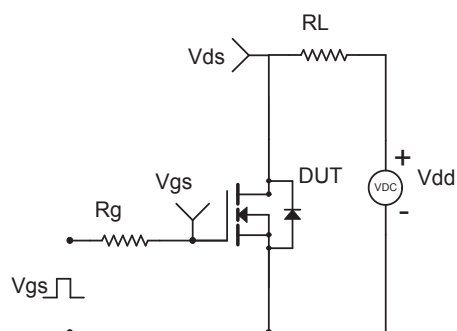
● Suggested Pad Layout



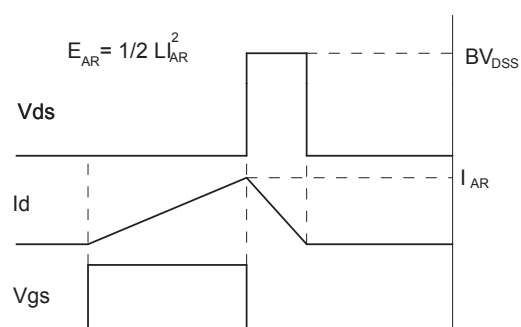
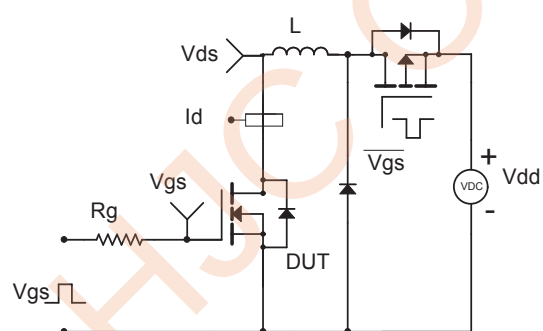
## 1. Gate Charge Test Circuit & Waveforms



## 2. Resistive Switching Test Circuit & Waveforms



## 3. Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



## 4. Diode Recovery Test Circuit & Waveforms

