

**200V N-CHANNEL ENHANCEMENT MODE MOSFET**

**MAIN CHARACTERISTICS**

|                               |                                  |
|-------------------------------|----------------------------------|
| $I_D$                         | 90A                              |
| $V_{DS}$                      | 200V                             |
| $R_{DS(on)-typ}(@V_{GS}=10V)$ | $<24m\Omega$ (Typ: <b>21mΩ</b> ) |

**FEATURES**

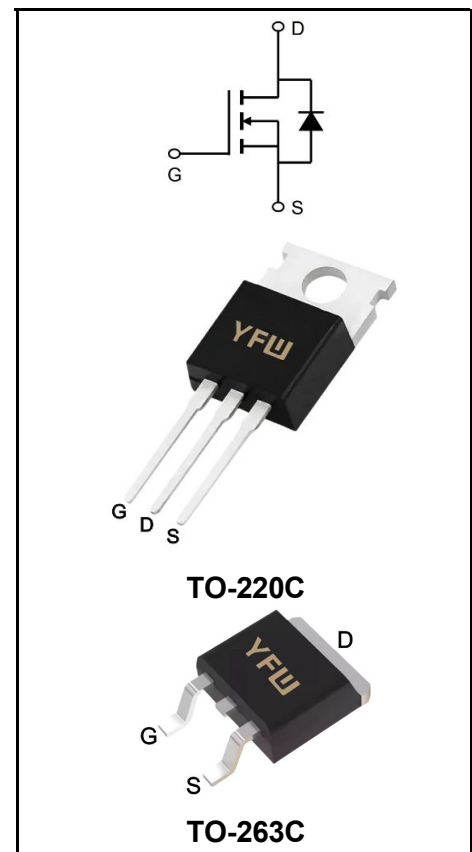
Adopt advanced trench technology to provide excellent Battery protection or in other Switching application.

**APPLICATIONS**

- ♦ Motor control and drive
- ♦ Battery management
- ♦ UPS (Uninterruptible Power Supplies)

**MECHANICAL DATA**

- ♦ Case: TO-220C/AC TO-263C/ASC
- ♦ Molded Plastic: UL Flammability Classification Rating 94V-0
- ♦ Lead free in compliance with EU RoHS 2011/65/EU directive
- ♦ Solder bath temperature 275°C maximum, 10s per JESD 22-B106



**Maximum Ratings at  $T_c=25^\circ\text{C}$  unless otherwise specified**

| Characteristics                         | Symbol          | Value       | Unit               |
|-----------------------------------------|-----------------|-------------|--------------------|
| Drain-Source Voltage                    | $V_{DS}$        | 200         | V                  |
| Gate-Source Voltage                     | $V_{GS}$        | $\pm 20$    | V                  |
| Continue Drain Current                  | $I_D$           | 90          | A                  |
| Pulsed Drain Current (Note1)            | $I_{DM}$        | 360         | A                  |
| Power Dissipation                       | $P_D$           | 132         | W                  |
| Single Pulse Avalanche Energy (Note1)   | $E_{AS}$        | 968         | mJ                 |
| Operating Temperature Range             | $T_J$           | 150         | $^\circ\text{C}$   |
| Storage Temperature Range               | $T_{STG}$       | -55 to +150 | $^\circ\text{C}$   |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$ | 0.95        | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 62.5        | $^\circ\text{C/W}$ |

Note1: Pulse test: 300  $\mu\text{s}$  pulse width, 2 % duty cycle

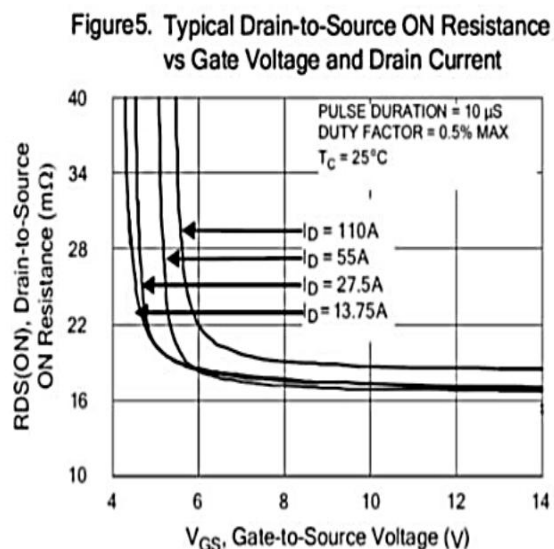
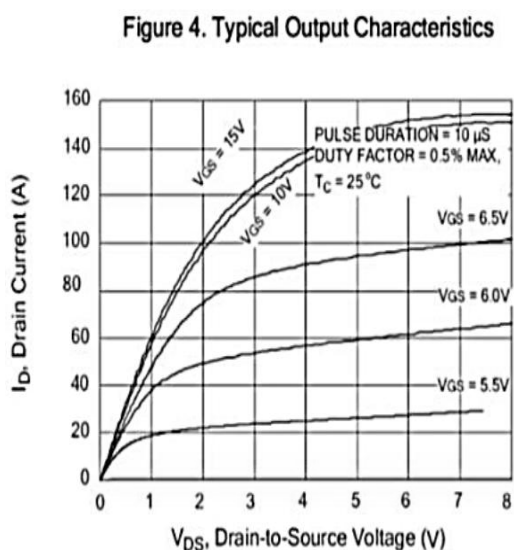
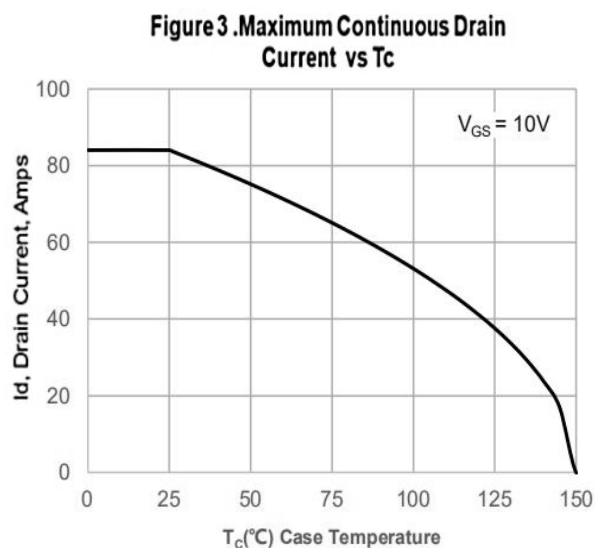
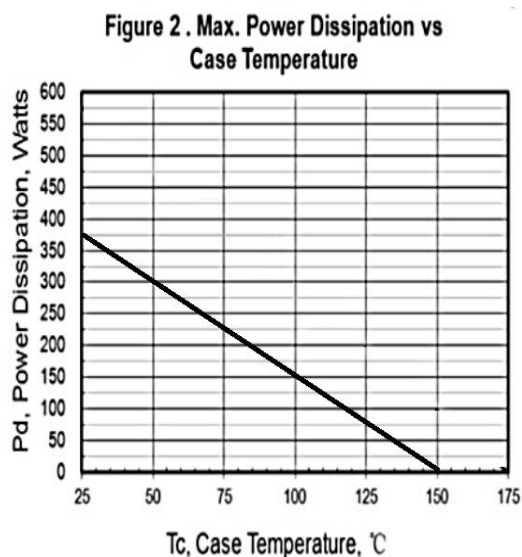
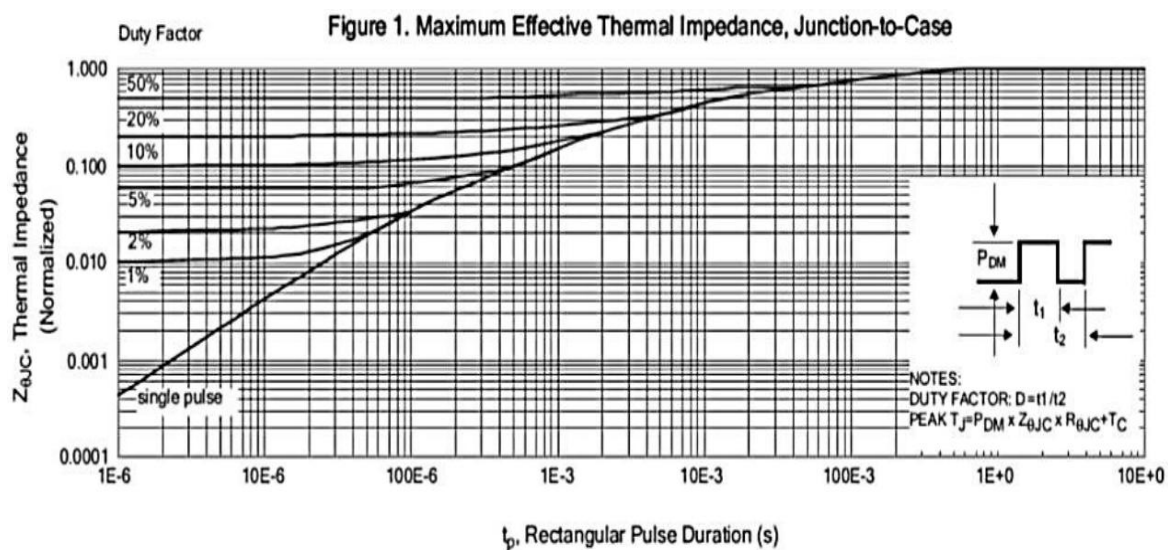
Note2: Limited by  $T_{Jmax}$ , starting  $T_J=25^\circ\text{C}$ ,  $L = 1\text{mH}$ ,  $V_{DS}=50\text{V}$ ,  $V_{GS}=10\text{V}$

**Electrical Characteristics at Tc=25°C unless otherwise specified**

| Characteristics                          | Test Condition                                                                    | Symbol       | Min | Typ  | Max       | Unit          |
|------------------------------------------|-----------------------------------------------------------------------------------|--------------|-----|------|-----------|---------------|
| Drain-Source Breakdown Voltage           | $V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$                                       | $BV_{DSS}$   | 200 | -    | -         | V             |
| Drain-Source Leakage Current             | $V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$                                      | $I_{DSS}$    | -   | -    | 1         | $\mu\text{A}$ |
| Gate Leakage Current                     | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$                                   | $I_{GSS}$    | -   | -    | $\pm 100$ | nA            |
| Gate-Source Threshold Voltage            | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                                           | $V_{GS(th)}$ | 3   | -    | 5         | V             |
| Drain-Source On-State Resistance         | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}$                                         | $R_{DS(on)}$ | -   | 21   | 24        | m $\Omega$    |
| Forward Transconductance                 | $V_{DS} = 5\text{ V}, I_D = 40\text{ A}$                                          | $g_{fs}$     | -   | 65   | -         | S             |
| Input Capacitance                        | $V_{GS} = 0\text{ V}$<br>$V_{DS} = 25\text{ V}$<br>$f = 1\text{ MHz}$             | $C_{iss}$    | -   | 6500 | -         | pF            |
| Output Capacitance                       |                                                                                   | $C_{oss}$    | -   | 500  | -         |               |
| Reverse Transfer Capacitance             |                                                                                   | $C_{rss}$    | -   | 210  | -         |               |
| Turn-on Delay Time(Note2)                | $V_{GS}=10\text{V}$<br>$V_{DD}=50\text{V}$<br>$R_G=2.5\Omega$<br>$I_D=40\text{A}$ | $t_{d(ON)}$  | -   | 45   | -         | ns            |
| Rise Time(Note2)                         |                                                                                   | $t_r$        | -   | 70   | -         |               |
| Turn-Off Delay Time(Note2)               |                                                                                   | $t_{d(OFF)}$ | -   | 110  | -         |               |
| Fall Time(Note2)                         |                                                                                   | $t_f$        | -   | 90   | -         |               |
| Total Gate Charge(Note2)                 | $V_{DS}=100\text{V}$<br>$V_{GS}=10\text{V}$<br>$I_D=40\text{A}$                   | $Q_G$        | -   | 85   | -         | nC            |
| Gate to Source Charge(Note2)             |                                                                                   | $Q_{GS}$     | -   | 15   | -         |               |
| Gate to Drain Charge(Note2)              |                                                                                   | $Q_{GD}$     | -   | 25   | -         |               |
| Maximun Body-Diode Continuous Current    |                                                                                   | $I_S$        | -   | -    | 90        | A             |
| Maximun Body-Diode Pulsed Current(Note2) |                                                                                   | $I_{SM}$     | -   | -    | 360       | A             |
| Drain-Source Diode Forward Voltage       | $V_{GS}=0\text{V}, I_S=30\text{A}, T_J=25^\circ\text{C}$                          | $V_{SD}$     | -   | -    | 1.2       | V             |
| Reverse Recovery Time(Note2)             | $T_J = 25^\circ\text{C}, I_F = 30\text{A}$<br>$di/dt = 100\text{A}/\mu\text{s}$   | $t_{rr}$     | -   | 110  | -         | ns            |
| Reverse Recovery Charge(Note2)           |                                                                                   | $Q_{rr}$     | -   | 0.55 | -         | nC            |

Note2:Pulse test: 300  $\mu\text{s}$  pulse width, 2 % duty cycle

**RATINGS AND CHARACTERISTIC CURVES**



RATINGS AND CHARACTERISTIC CURVES

Figure 6. Peak Current Capability

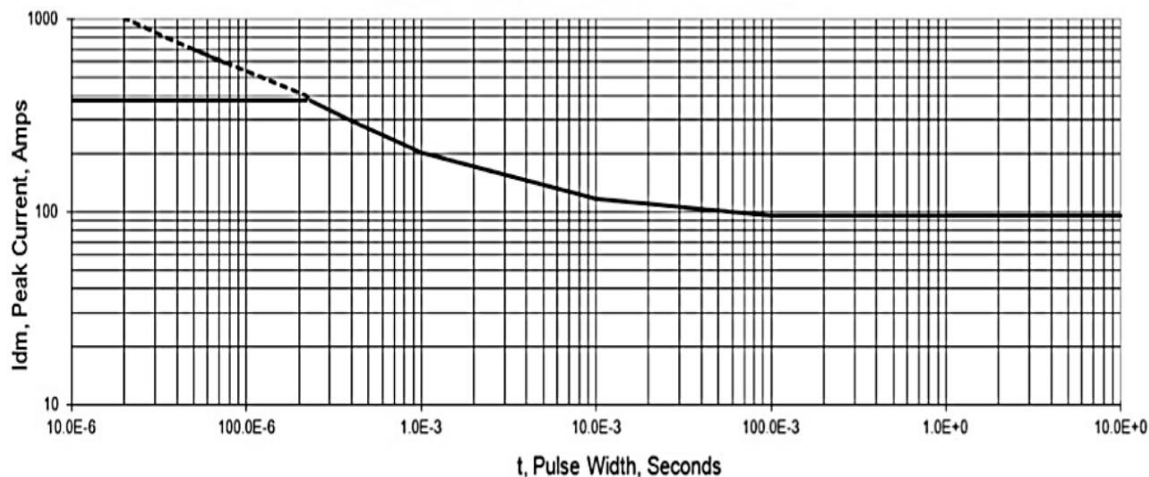


Figure 7. Typical Transfer Characteristics

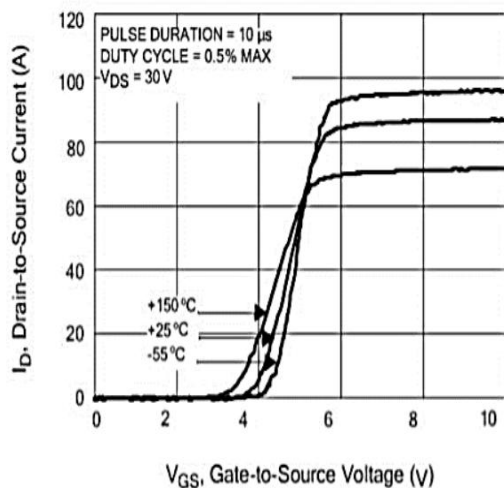


Figure 8. Unclamped Inductive Switching Capability

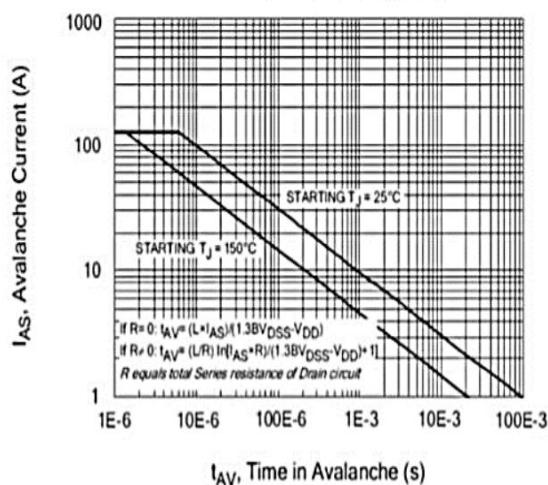


Figure 15. Typical Gate Charge

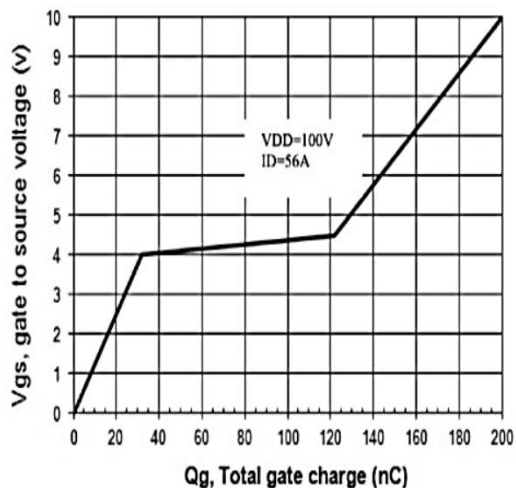
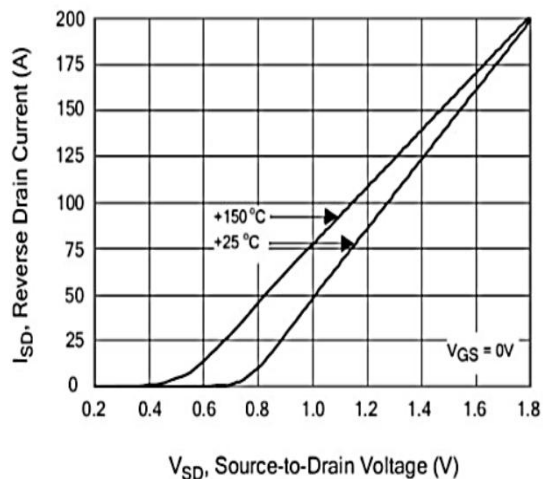


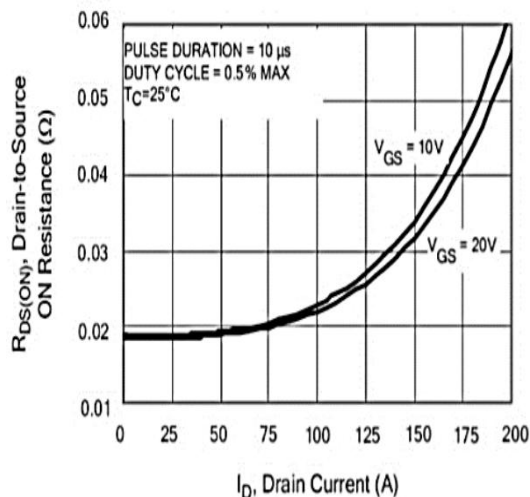
Figure 16. Typical Body Diode Transfer Characteristics



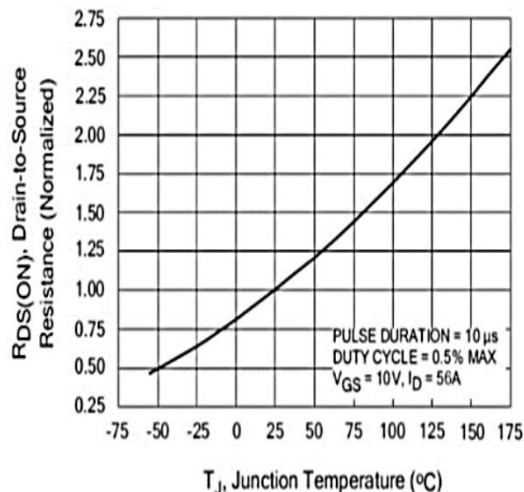


**RATINGS AND CHARACTERISTIC CURVES**

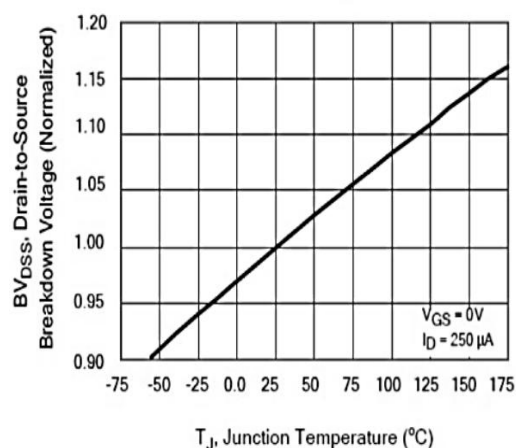
**Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current**



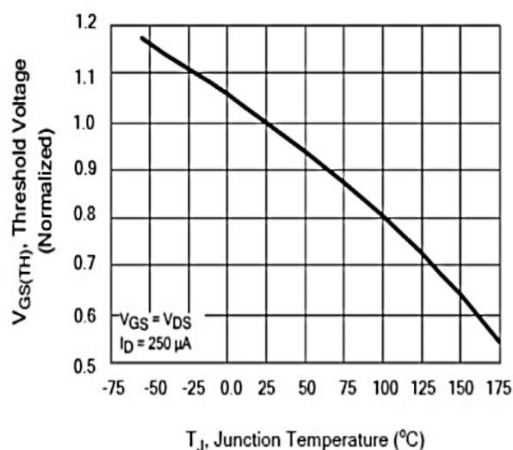
**Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature**



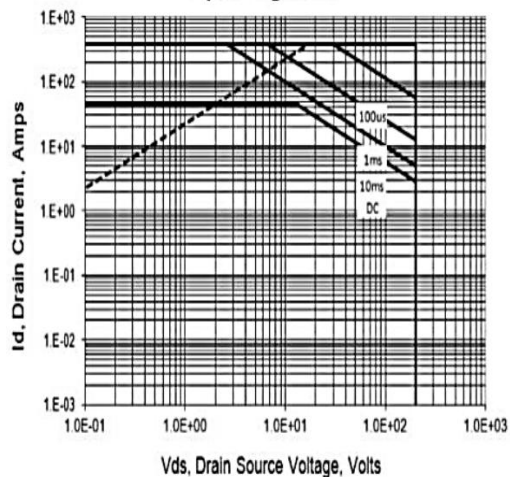
**Figure 11. Typical Breakdown Voltage vs Junction Temperature**



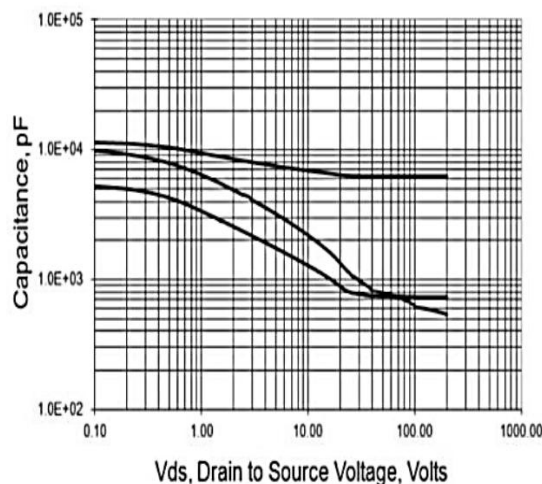
**Figure 12. Typical Threshold Voltage vs Junction Temperature**



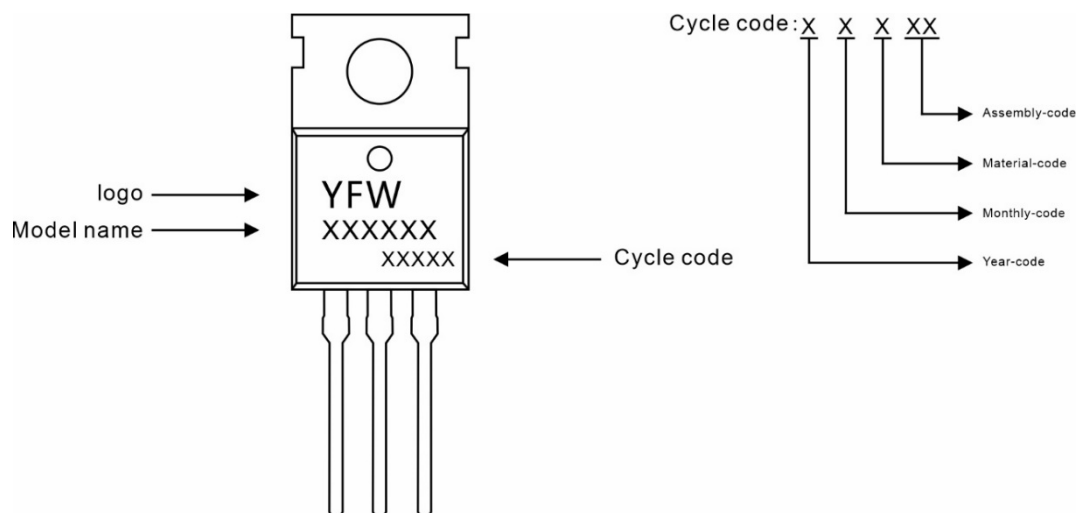
**Figure 13. Maximum Safe Operating Area**



**Figure 14. Capacitance vs Vds**



## Marking Diagram



## Ordering information

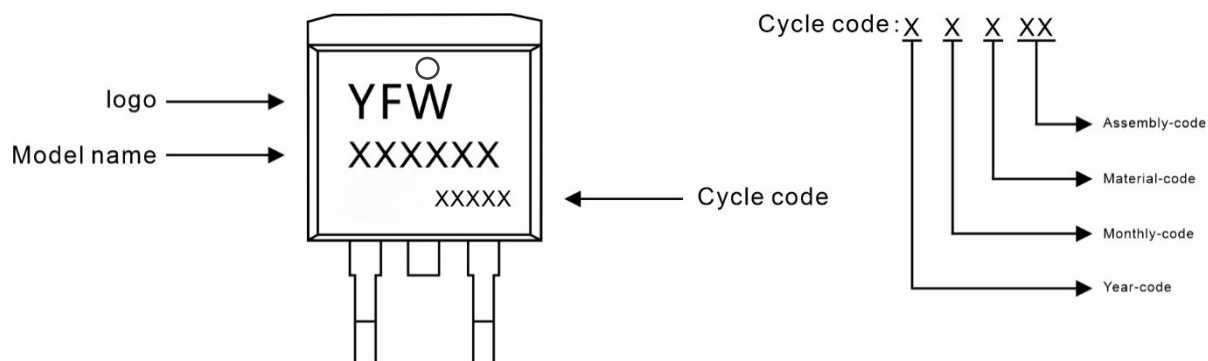
| Model name  | Package | Unit Weight   | Base Quantity | Packing Quantity           |
|-------------|---------|---------------|---------------|----------------------------|
| YFW90N20HAC | TO-220C | 0.07oz(1.96g) | 50pcs/tube    | 1000PCS/Box 5000PCS/Carton |

## Package Dimensions

### TO-220C

| Dim | Millimeter |       | Inches |       |
|-----|------------|-------|--------|-------|
|     | Min.       | Max.  | Min.   | Max.  |
| A   | 4.34       | 4.67  | 0.171  | 0.184 |
| A1  | 2.52       | 2.82  | 0.099  | 0.111 |
| b   | 0.71       | 0.91  | 0.028  | 0.036 |
| b1  | 1.17       | 1.37  | 0.046  | 0.054 |
| c   | 0.30       | 0.50  | 0.012  | 0.020 |
| c1  | 1.17       | 1.37  | 0.046  | 0.054 |
| D   | 9.90       | 10.20 | 0.390  | 0.402 |
| E   | 8.50       | 8.90  | 0.335  | 0.350 |
| E1  | 12.00      | 12.50 | 0.472  | 0.492 |
| e   | 2.44       | 2.64  | 0.096  | 0.104 |
| e1  | 4.88       | 5.28  | 0.192  | 0.208 |
| F   | 2.60       | 2.80  | 0.102  | 0.110 |
| L   | 13.20      | 13.80 | 0.520  | 0.543 |
| L1  | 3.80       | 4.20  | 0.150  | 0.165 |
| Φ   | 3.60       | 3.96  | 0.142  | 0.156 |

## Marking Diagram



## Ordering information

| Model name   | Package | Unit Weight   | Base Quantity | Packing Quantity           |
|--------------|---------|---------------|---------------|----------------------------|
| YFW90N20HASC | TO-263C | 0.04oz(1.16g) | 800pcs/reel   | 1600pcs/box 8000pcs/Carton |

## Package Dimensions

### TO-263C

| Dim | Millimeter |       | Inches |       |
|-----|------------|-------|--------|-------|
|     | Min.       | Max.  | Min.   | Max.  |
| A   | 4.30       | 4.70  | 0.169  | 0.185 |
| A1  | 0.00       | 0.15  | 0.000  | 0.006 |
| A2  | 4.30       | 4.55  | 0.169  | 0.179 |
| B   | 1.10       | 1.50  | 0.043  | 0.059 |
| b   | 0.70       | 0.90  | 0.028  | 0.035 |
| b1  | 1.20       | 1.50  | 0.047  | 0.059 |
| c   | 0.30       | 0.60  | 0.012  | 0.024 |
| c1  | 1.17       | 1.37  | 0.046  | 0.054 |
| D   | 9.90       | 10.20 | 0.390  | 0.402 |
| E   | 8.50       | 8.90  | 0.335  | 0.350 |
| e   | 2.44       | 2.64  | 0.096  | 0.104 |
| e1  | 4.88       | 5.28  | 0.192  | 0.208 |
| L   | 15.00      | 15.30 | 0.591  | 0.602 |
| L1  | 5.20       | 5.40  | 0.205  | 0.213 |
| L2  | 2.40       | 2.60  | 0.094  | 0.102 |
| L3  | 1.60       | 1.80  | 0.063  | 0.071 |

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