

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 650V          | 65mΩ@10V        | 47A   |



**合肥矽普半导体**

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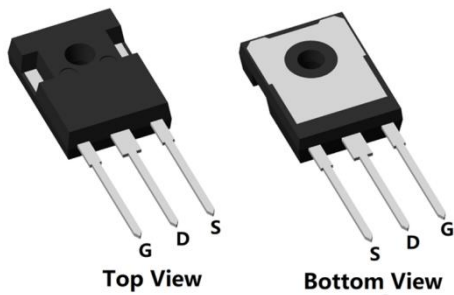
## Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

## Applications

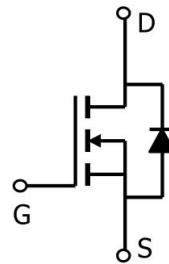
- PWM Application
- Hard switched and high frequency circuits
- Power Management

## Package

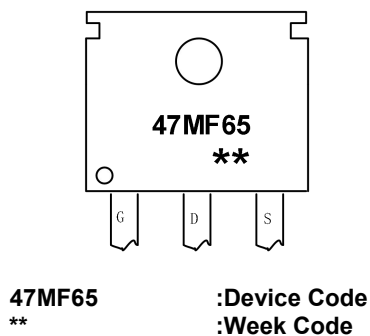


TO-247(1:G 2:D 3:S)

## Circuit diagram



## Marking



## Order Information

| Device     | Package | Unit/Tube |
|------------|---------|-----------|
| SP47MF65TF | TO-247  | 30        |

**Absolute maximum ratings (Ta=25°C, unless otherwise noted)**

| Parameter                                  | Symbol          | Rating     | Units |
|--------------------------------------------|-----------------|------------|-------|
| Drain-Source Voltage                       | $V_{DS}$        | 650        | V     |
| Gate-Source Voltage                        | $V_{GS}$        | $\pm 30$   | V     |
| Continuous Drain Current (Tc=25°C)         | $I_D$           | 47         | A     |
| Continuous Drain Current (Tc=100°C)        | $I_D$           | 29         | A     |
| Pulsed Drain Current                       | $I_{DM}$        | 188        | A     |
| Single Pulse Avalanche Energy <sup>1</sup> | $E_{AS}$        | 1160       | mJ    |
| Power Dissipation (Tc=25°C)                | $P_D$           | 391        | W     |
| Thermal Resistance Junction-to-Case        | $R_{\theta JC}$ | 0.32       | °C/W  |
| Storage Temperature Range                  | $T_{STG}$       | -55 to 150 | °C    |
| Operating Junction Temperature Range       | $T_J$           | -55 to 150 | °C    |

**Electrical characteristics (Ta=25°C, unless otherwise noted)**

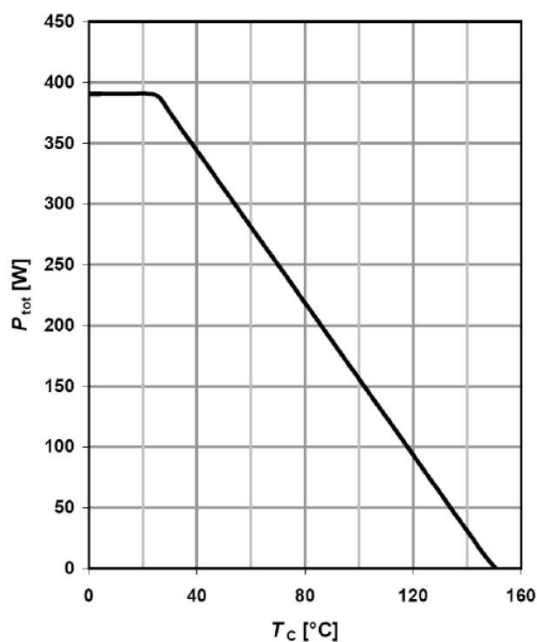
| Parameter                             | Symbol       | Conditions                                      | Min. | Typ. | Max.      | Unit       |
|---------------------------------------|--------------|-------------------------------------------------|------|------|-----------|------------|
| Static Characteristics                |              |                                                 |      |      |           |            |
| Drain-Source Breakdown Voltage        | $BV_{DSS}$   | $I_D = 250\mu A, V_{GS} = 0V$                   | 650  | -    | -         | V          |
| Drain-Source Leakage Current          | $I_{DSS}$    | $V_{DS} = 520V, V_{GS} = 0V$                    | -    | -    | 1         | $\mu A$    |
| Gate-Source Leakage Current           | $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                 | -    | -    | $\pm 0.1$ | nA         |
| Gate Threshold Voltage                | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$               | 3    | 4    | 5         | V          |
| Static Drain-Source On-Resistance     | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 23A$                       | -    | 65   | 75        | m $\Omega$ |
| Dynamic characteristics               |              |                                                 |      |      |           |            |
| Input Capacitance                     | $C_{iss}$    | $V_{DS}=100V, V_{GS}=0V, f=1MHz$                | -    | 3936 | -         | pF         |
| Output Capacitance                    | $C_{oss}$    |                                                 | -    | 144  | -         |            |
| Reverse Transfer Capacitance          | $C_{rss}$    |                                                 | -    | 5.9  | -         |            |
| Total Gate Charge                     | $Q_g$        | $V_{DS}=480V, V_{GS}=10V, I_D=23A$              | -    | 248  | -         | nC         |
| Gate-Source Charge                    | $Q_{gs}$     |                                                 | -    | 45   | -         |            |
| Gate-Drain Charge                     | $Q_{gd}$     |                                                 | -    | 115  | -         |            |
| Switching Characteristics             |              |                                                 |      |      |           |            |
| Turn-On Delay Time                    | $T_{d(on)}$  | $V_{DD}=480V, V_{GS}=10V, R_G=2\Omega, I_D=10A$ | -    | 28   | -         | nS         |
| Rise Time                             | $T_r$        |                                                 | -    | 12.8 | -         |            |
| Turn-Off Delay Time                   | $T_{d(off)}$ |                                                 | -    | 115  | -         |            |
| Fall Time                             | $T_f$        |                                                 | -    | 6.4  | -         |            |
| Diode Characteristics                 |              |                                                 |      |      |           |            |
| Diode Forward Voltage                 | $V_{SD}$     | $V_{GS}=0V, I_S=1A, T_J=25^{\circ}C$            | -    | -    | 1.2       | V          |
| Maximum Body-Diode Continuous Current | $I_S$        |                                                 | -    | -    | 47        | A          |
| Reverse recover time                  | $T_{rr}$     | $I_S=23A, di/dt=100A/\mu s, T_J=25^{\circ}C$    | -    | 268  | -         | nS         |
| Reverse recovery charge               | $Q_{rr}$     |                                                 | -    | 1.5  | -         | $\mu C$    |

**Note :**

1. The test condition is  $V_{DD}=100V, V_{GS}=10V, L=60mH, R_G=25\Omega$

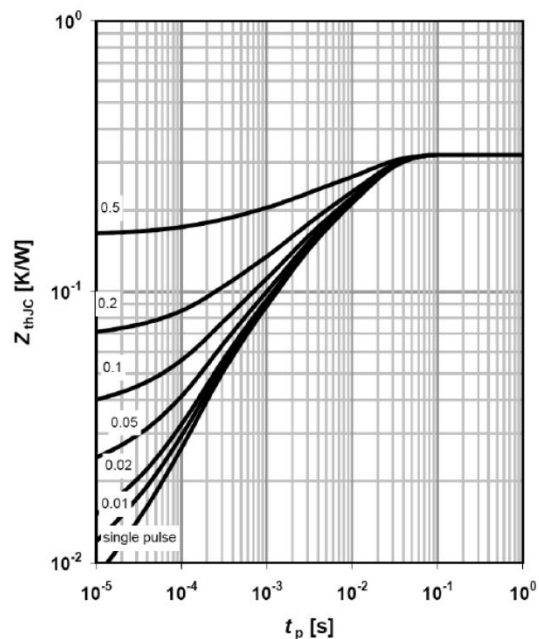
## Typical Characteristics

Power dissipation



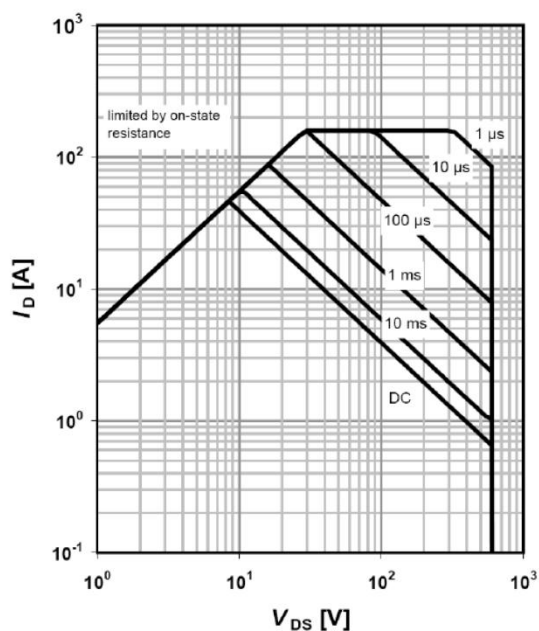
$$P_{tot} = f(T_c)$$

Max. transient thermal impedance



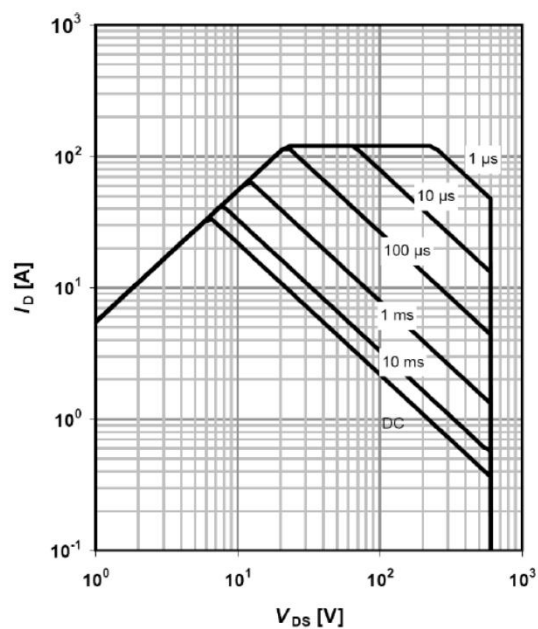
$$Z_{thJC} = f(t_p); \text{ parameter: } D = t_p / T$$

Safe operating area  $T_c = 25^\circ\text{C}$



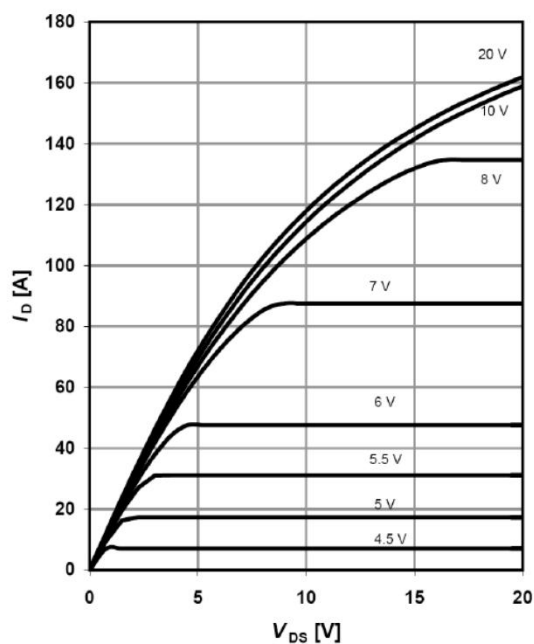
$$I_D = f(V_{DS}); T_c = 25^\circ\text{C}; V_{GS} > 7\text{V}; D=0; \text{ parameter } t_p$$

Safe operating area  $T_c = 80^\circ\text{C}$



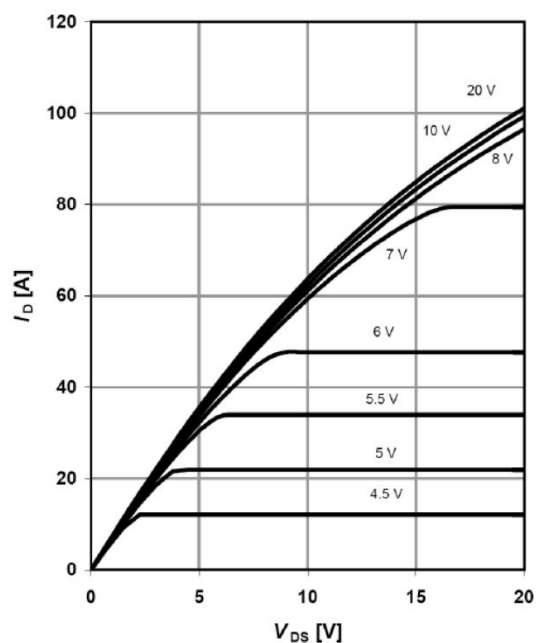
$$I_D = f(V_{DS}); T_c = 80^\circ\text{C}; V_{GS} > 7\text{V}; D=0; \text{ parameter } t_p$$

Typ. output characteristics  $T_j=25\text{ }^{\circ}\text{C}$



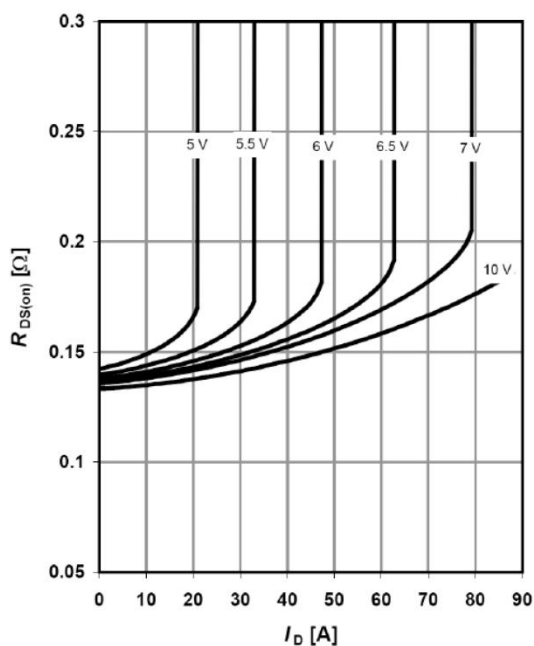
$I_D=f(V_{DS}); T_j=25\text{ }^{\circ}\text{C};$  parameter:  $V_{GS}$

Typ. output characteristics  $T_j=125\text{ }^{\circ}\text{C}$



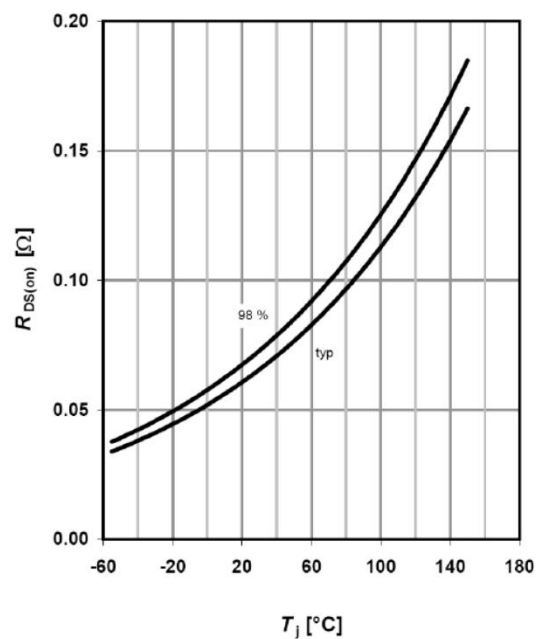
$I_D=f(V_{DS}); T_j=125\text{ }^{\circ}\text{C};$  parameter:  $V_{GS}$

Typ. drain-source on-state resistance



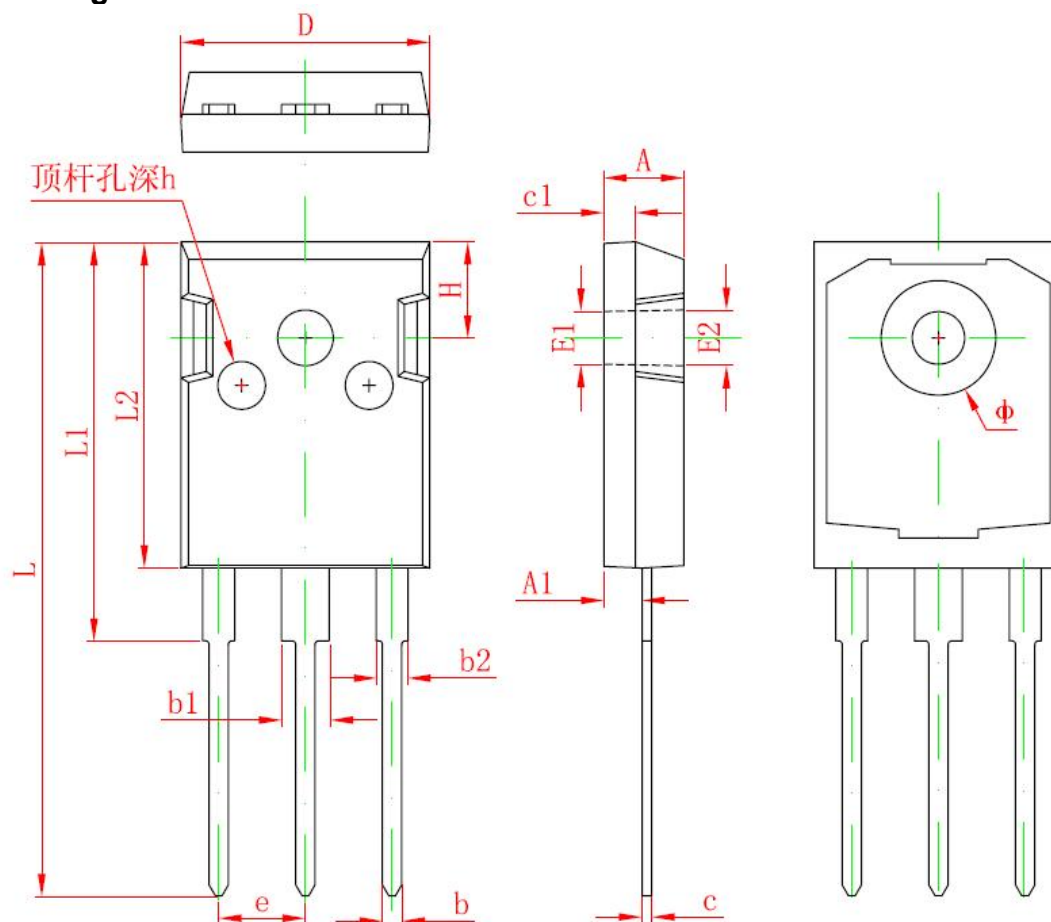
$R_{DS(on)}=f(I_D); T_j=125\text{ }^{\circ}\text{C};$  parameter:  $V_{GS}$

Drain-source on-state resistance



$R_{DS(on)}=f(T_j); I_D=17.6\text{ A}; V_{GS}=10\text{ V}$

## TO-247 Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.850                     | 5.150  | 0.191                | 0.200 |
| A1     | 2.200                     | 2.600  | 0.087                | 0.102 |
| b2     | 1.800                     | 2.200  | 0.071                | 0.087 |
| b      | 1.000                     | 1.400  | 0.039                | 0.055 |
| b1     | 2.800                     | 3.200  | 0.110                | 0.126 |
| c      | 0.500                     | 0.700  | 0.020                | 0.028 |
| c1     | 1.900                     | 2.100  | 0.075                | 0.083 |
| D      | 15.450                    | 15.750 | 0.608                | 0.620 |
| E1     | 3.500 REF.                |        | 0.138 REF.           |       |
| E2     | 3.600 REF.                |        | 0.142 REF.           |       |
| L      | 40.900                    | 41.300 | 1.610                | 1.626 |
| L1     | 24.800                    | 25.100 | 0.976                | 0.988 |
| L2     | 20.300                    | 20.600 | 0.799                | 0.811 |
| Φ      | 7.100                     | 7.300  | 0.280                | 0.287 |
| e      | 5.450 TYP.                |        | 0.215 TYP.           |       |
| H1     | 5.980 REF.                |        | 0.235 REF.           |       |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |