

## P-CHANNEL SILICON POWER MOSFET

## FAP-III SERIES

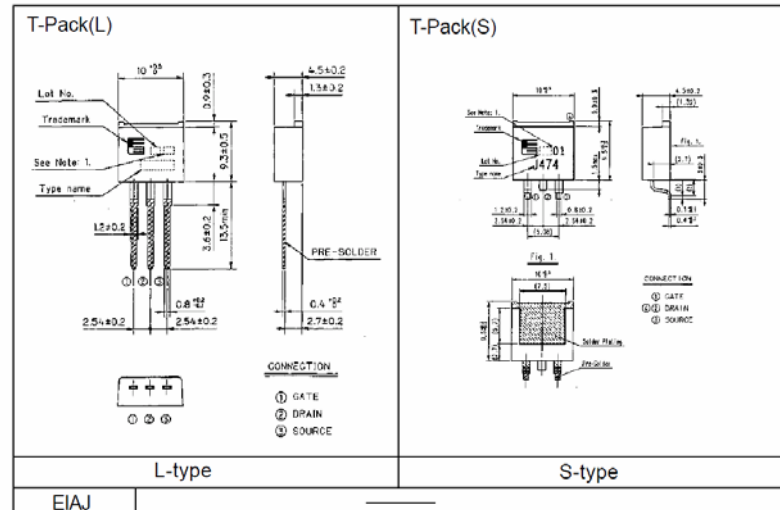
### Features

- High speed switching
- Low on-resistance
- No secondary breakdown
- Low driving power
- High forward Transconductance
- Avalanche-proof

### Applications

- Switching regulators
- DC-DC converters
- General purpose power amplifier

### Outline Drawings



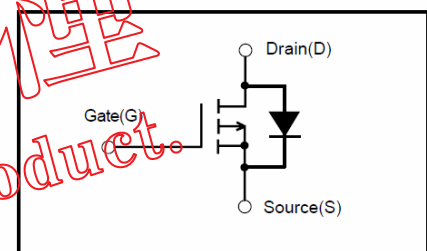
### Maximum ratings and characteristics

- Absolute maximum ratings ( $T_c=25^\circ\text{C}$  unless otherwise specified)

| Item                                                 | Symbol                | Rating              | Unit             |
|------------------------------------------------------|-----------------------|---------------------|------------------|
| Drain-source voltage                                 | $V_{DS}$              | -60                 | V                |
| Continuous drain current                             | $I_D$                 | $\pm 7$             | A                |
| Pulsed drain current                                 | $I_{D(puls)}$         | $\pm 28$            | A                |
| Gate-source voltage                                  | $V_{GS}$              | $\pm 20$            | V                |
| Maximum avalanche energy                             | $E_{AV}$              | 110.8               | mJ               |
| Maximum power dissipation ( $T_c=25^\circ\text{C}$ ) | $P_D$                 | 20                  | W                |
| Operating and storage temperature range              | $T_{ch}$<br>$T_{stg}$ | +150<br>-55 to +150 | $^\circ\text{C}$ |

\*1  $L=3.02\text{mH}$ ,  $V_{CC}=-24\text{V}$

### Equivalent circuit schematic



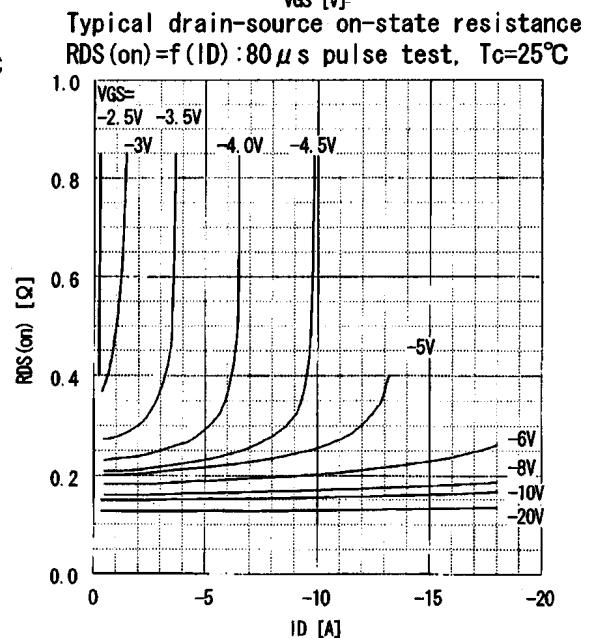
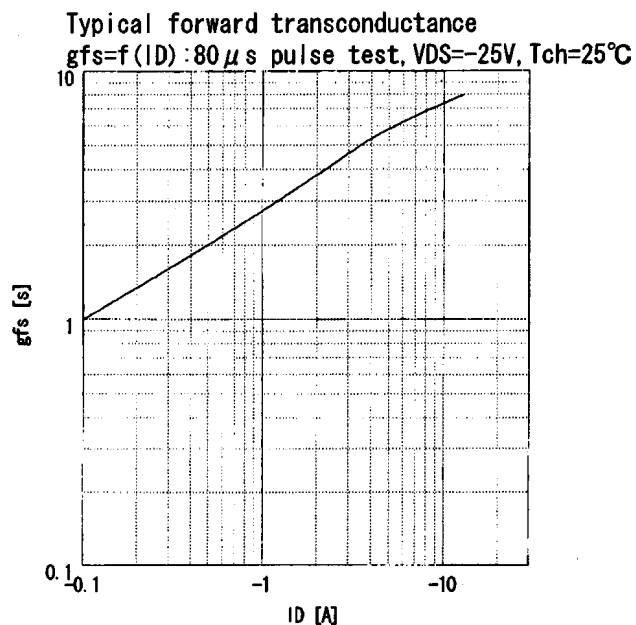
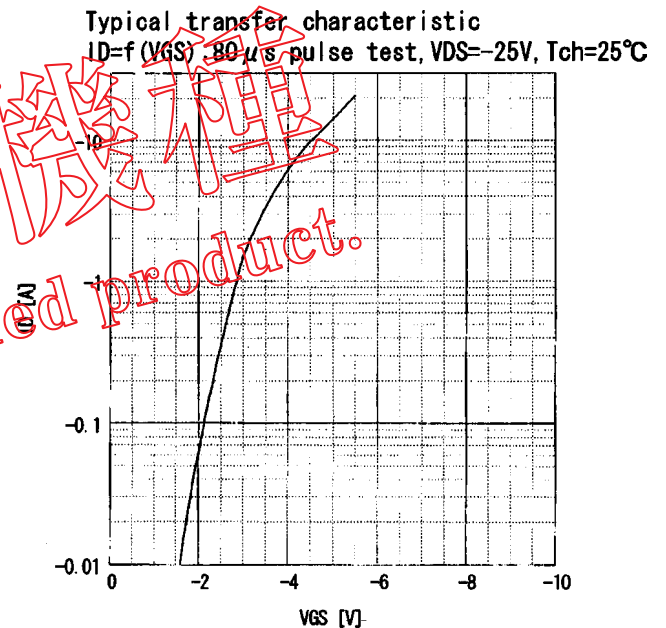
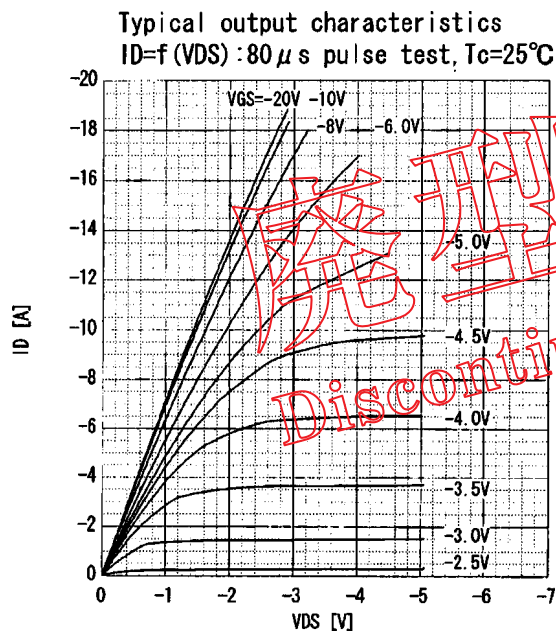
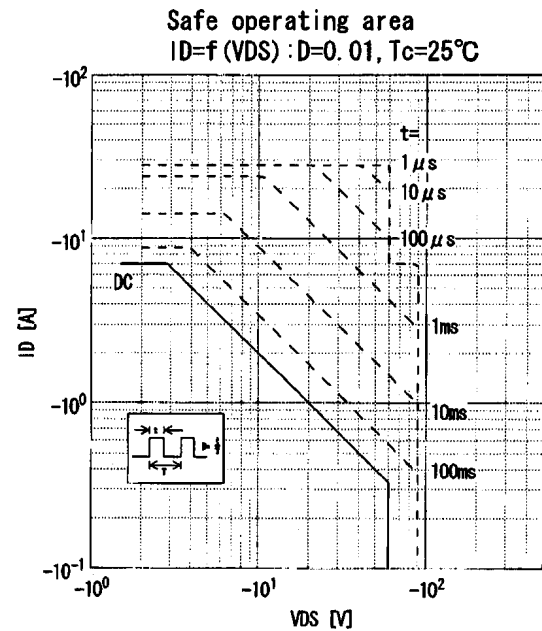
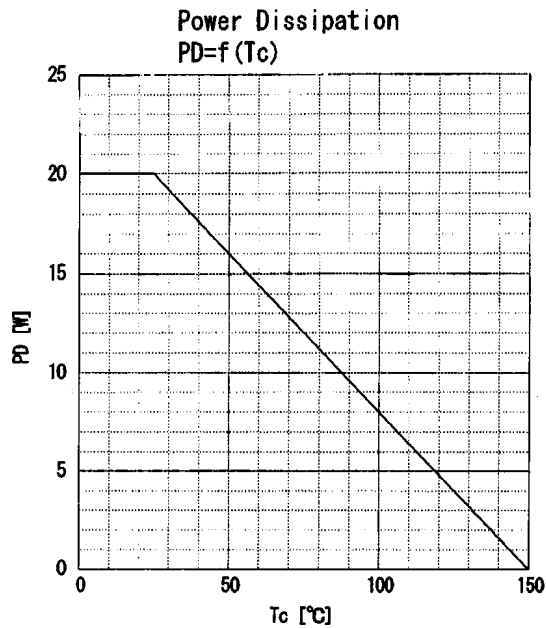
- Electrical characteristics ( $T_c=25^\circ\text{C}$  unless otherwise specified)

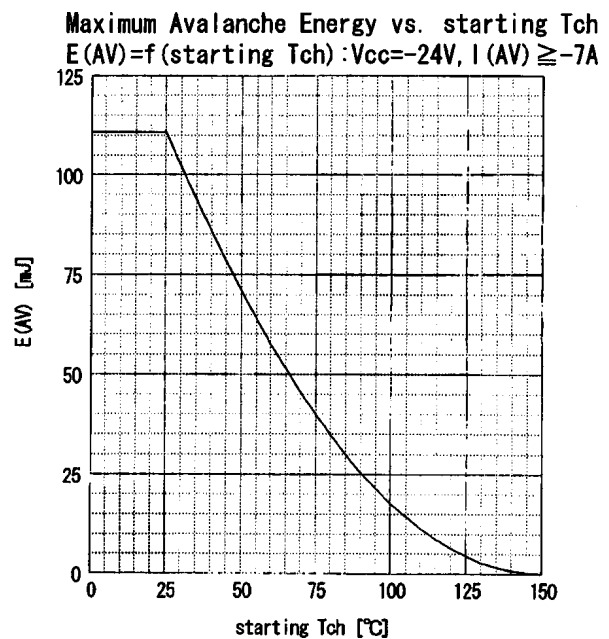
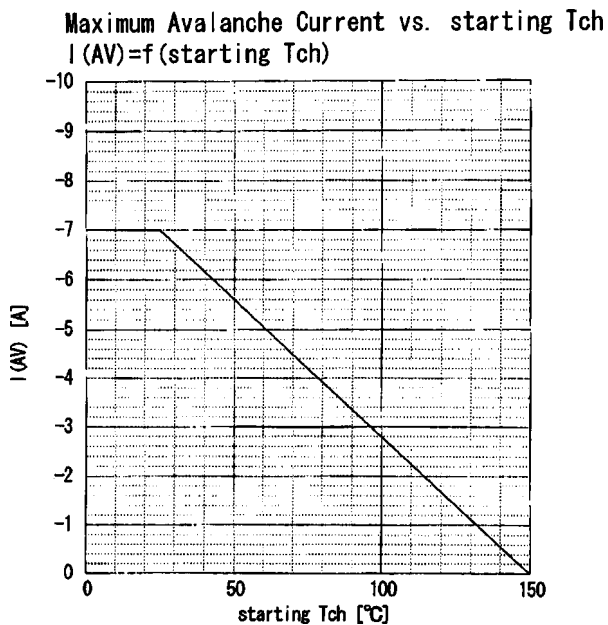
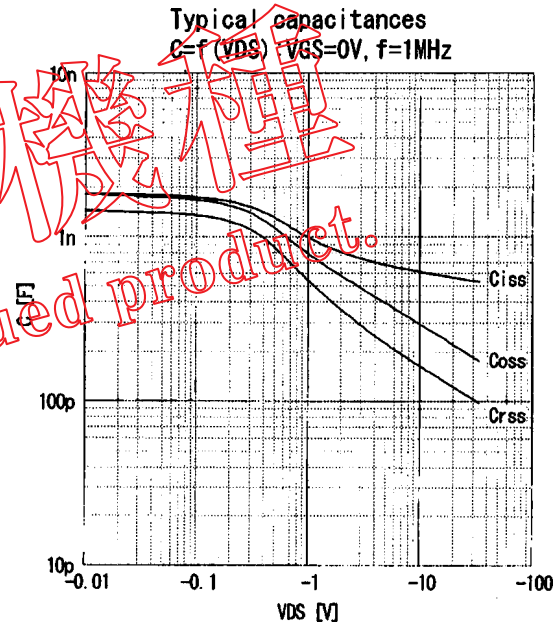
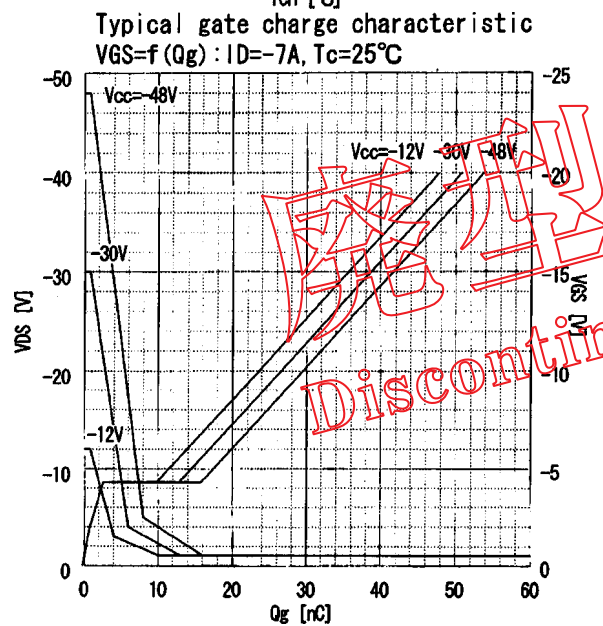
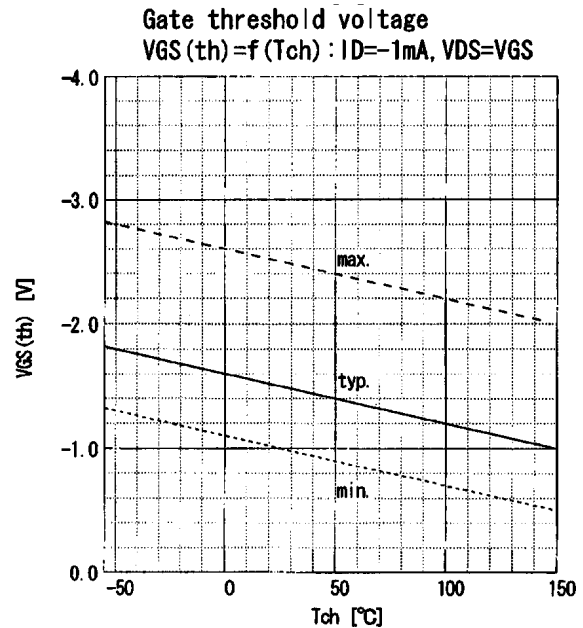
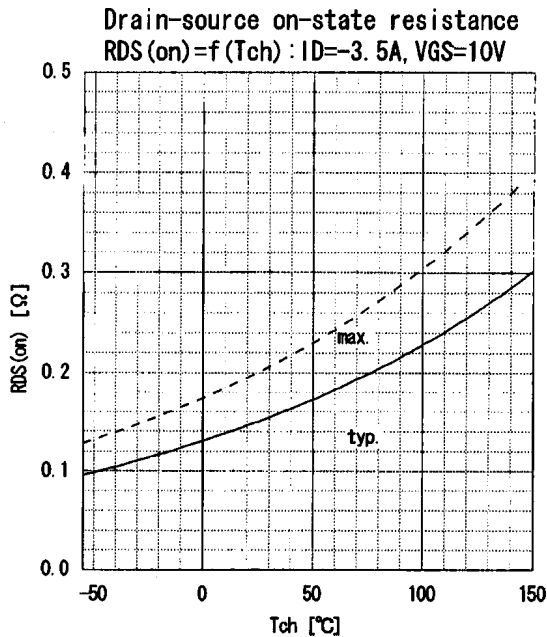
| Item                             | Symbol       | Test Conditions                                            | Min. | Typ.  | Max. | Units            |
|----------------------------------|--------------|------------------------------------------------------------|------|-------|------|------------------|
| Drain-source breakdown voltage   | $BV_{DS}$    | $I_D=1\text{mA}$ $V_{GS}=0\text{V}$                        | -60  |       |      | V                |
| Gate threshold voltage           | $V_{GS(th)}$ | $I_D=1\text{mA}$ $V_{DS}=V_{GS}$                           | -1.0 | -1.5  | -2.5 | V                |
| Zero gate voltage drain current  | $I_{DSS}$    | $V_{DS}=-60\text{V}$ $V_{GS}=0\text{V}$                    |      | -10   | -500 | $\mu\text{A}$    |
|                                  |              | $T_{ch}=125^\circ\text{C}$                                 |      | -0.2  | -1.0 | mA               |
| Gate-source leakage current      | $I_{GSS}$    | $V_{GS}=\pm 20\text{V}$ $V_{DS}=0\text{V}$                 |      | 10    | 100  | nA               |
| Drain-source on-state resistance | $R_{DS(on)}$ | $I_D=-3.5\text{A}$ $V_{GS}=-4\text{V}$                     |      | 260   | 350  | $\text{m}\Omega$ |
|                                  |              | $V_{GS}=-10\text{V}$                                       |      | 150   | 200  | $\text{m}\Omega$ |
| Forward transconductance         | $g_{fs}$     | $I_D=3.5\text{A}$ $V_{DS}=-25\text{V}$                     | 2.5  | 5.0   |      | S                |
| Input capacitance                | $C_{iss}$    | $V_{DS}=-25\text{V}$                                       |      | 550   | 830  | pF               |
| Output capacitance               | $C_{oss}$    | $V_{GS}=0\text{V}$                                         |      | 200   | 300  | pF               |
| Reverse transfer capacitance     | $C_{rss}$    | $f=1\text{MHz}$                                            |      | 110   | 170  | pF               |
| Turn-on time                     | $t_{d(on)}$  | $V_{CC}=-30\text{V}$ $R_G=10\Omega$                        |      | 10    | 15   | ns               |
|                                  | $t_r$        | $I_D=-7\text{A}$                                           |      | 20    | 30   | ns               |
| Turn-off time                    | $t_{d(off)}$ | $V_{GS}=-10\text{V}$                                       |      | 60    | 90   | ns               |
|                                  | $t_f$        |                                                            |      | 25    | 50   | ns               |
| Avalanche capability             | $I_{AV}$     | $L=100\mu\text{H}$ $T_{ch}=25^\circ\text{C}$               | -7   |       |      | A                |
| Diode forward on-voltage         | $V_{SD}$     | $I_F=2I_{DR}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$ |      | -2.50 | -3.8 | V                |
| Reverse recovery time            | $t_{rr}$     | $I_F=I_{DR}$ $V_{GS}=0\text{V}$                            |      | 110   |      | ns               |
| Reverse recovery charge          | $Q_{rr}$     | $-di/dt=100\text{A}/\mu\text{s}$ $T_{ch}=25^\circ\text{C}$ |      | 0.50  |      | $\mu\text{C}$    |

### Thermal characteristics

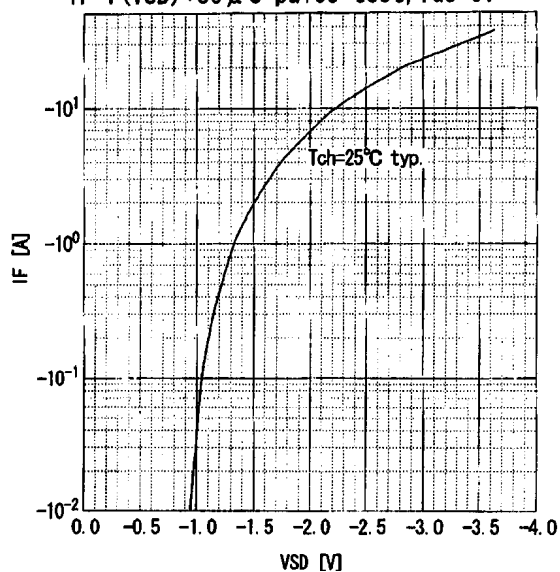
| Item               | Symbol         | Min. | Typ. | Max.  | Units                     |
|--------------------|----------------|------|------|-------|---------------------------|
| Thermal resistance | $R_{th(ch-c)}$ |      |      | 6.25  | $^\circ\text{C}/\text{W}$ |
|                    | $R_{th(ch-a)}$ |      |      | 125.0 | $^\circ\text{C}/\text{W}$ |

■ Characteristics





Forward characteristic of reverse of diode

 $I_F = f(V_{SD}) : 80 \mu s$  pulses test,  $V_{GS} = 0V$ 

Transient thermal impedande

 $Z_{thch} = f(t)$  parameter:  $D = t/T$ 