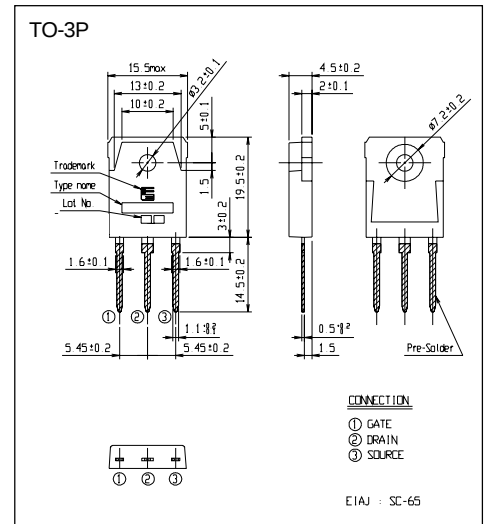


**N-CHANNEL SILICON POWER MOSFET****FAP-IIIB SERIES****■ Features**

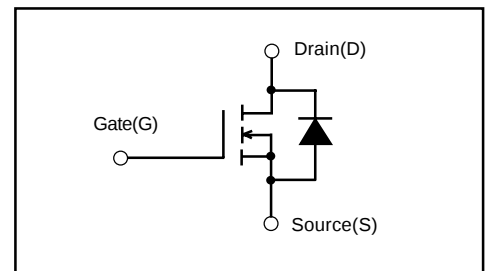
- High speed switching
- Low on-resistance
- No secondary breakdown
- Low driving power
- High voltage
- Avalanche-proof

**■ Applications**

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

**■ Outline Drawings****■ Maximum ratings and characteristics****● Absolute maximum ratings (Tc=25°C unless otherwise specified)**

| Item                                    | Symbol                              | Rating              | Unit | Remarks |
|-----------------------------------------|-------------------------------------|---------------------|------|---------|
| Drain-source voltage                    | V <sub>DS</sub>                     | 30                  | V    |         |
| Continuous drain current                | I <sub>D</sub>                      | ±100                | A    |         |
| Pulsed drain current                    | I <sub>D</sub> [puls]               | ±400                | A    |         |
| Gate-source peak voltage                | V <sub>GS</sub>                     | ±16                 | V    |         |
| Maximum avalanche energy                | E <sub>AV</sub>                     | 2536.7              | mJ   | *1      |
| Maximum power dissipation               | P <sub>D</sub>                      | 150                 | W    |         |
| Operating and storage temperature range | T <sub>ch</sub><br>T <sub>stg</sub> | +150<br>-55 to +150 | °C   |         |

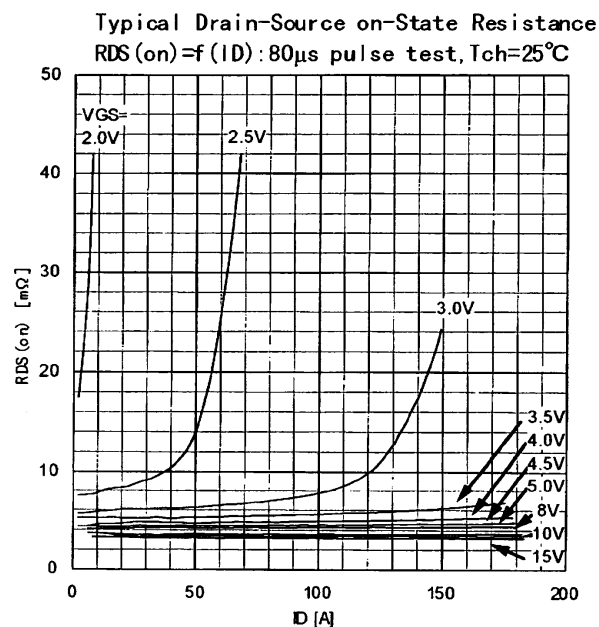
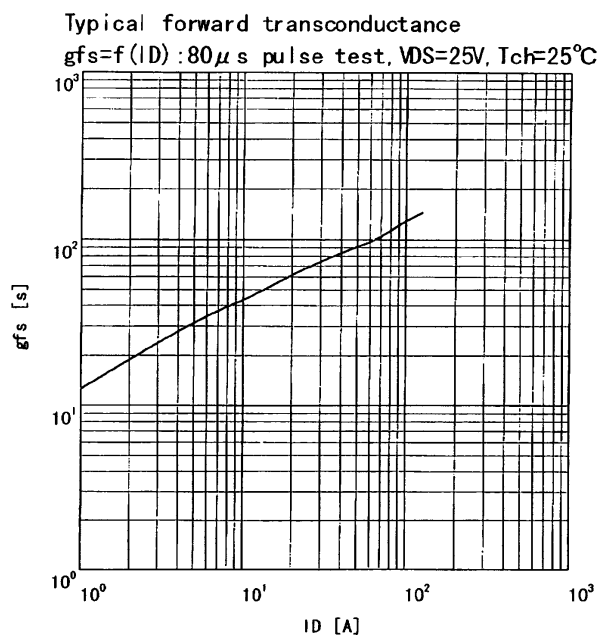
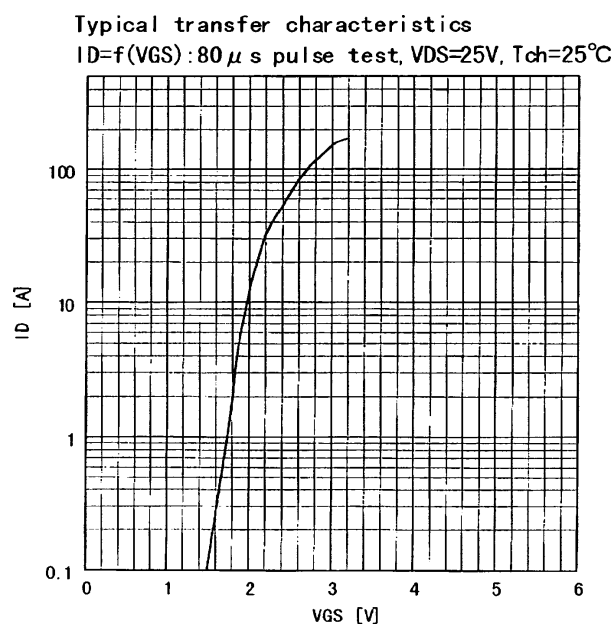
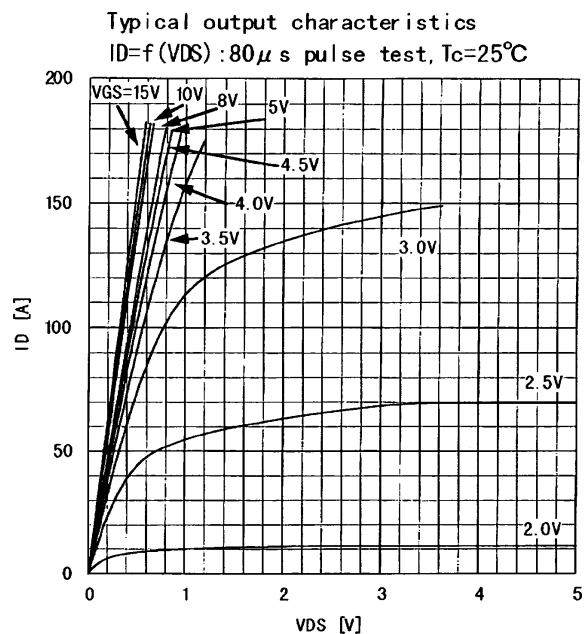
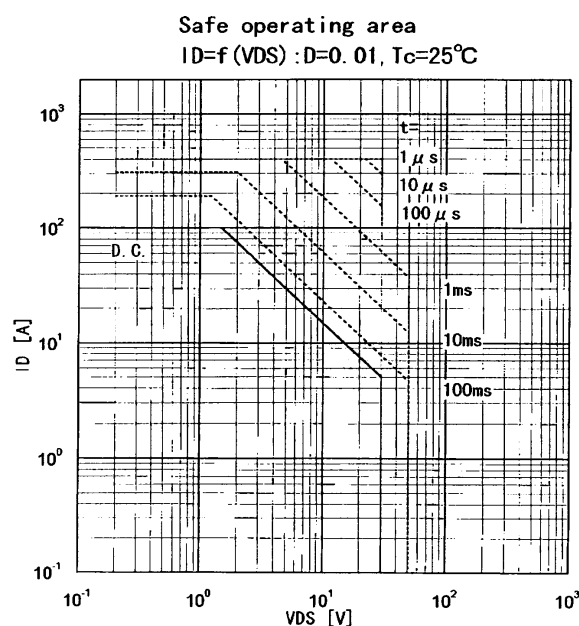
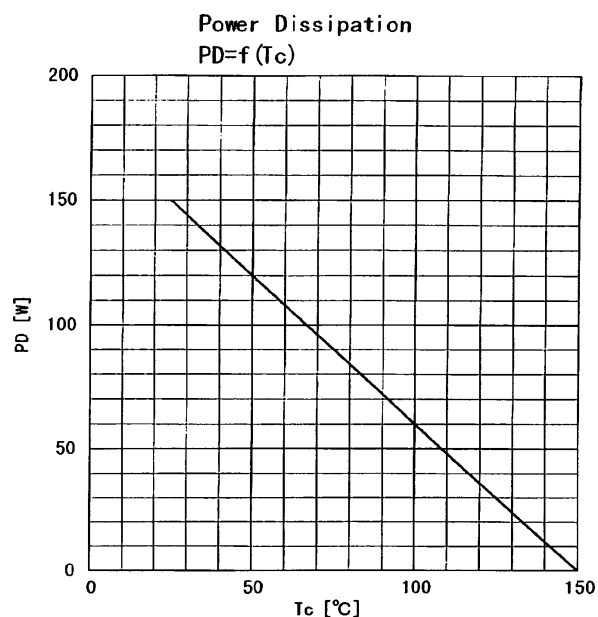
\*1 L=0.338mH, V<sub>CC</sub>=12V**■ Equivalent circuit schematic****● Electrical characteristics (Tc =25°C unless otherwise specified)**

| Item                             | Symbol               | Test Conditions                                                                     | Min. | Typ. | Max. | Units |
|----------------------------------|----------------------|-------------------------------------------------------------------------------------|------|------|------|-------|
| Drain-source breakdown voltage   | V <sub>(BR)DSS</sub> | I <sub>D</sub> =1mA V <sub>GS</sub> =0V                                             | 30   |      |      | V     |
| Gate threshold voltage           | V <sub>GS(th)</sub>  | I <sub>D</sub> =1mA V <sub>DS</sub> =V <sub>GS</sub>                                | 1.0  | 1.5  | 2.0  | V     |
| Zero gate voltage drain current  | I <sub>DSS</sub>     | V <sub>DS</sub> =30V V <sub>GS</sub> =0V                                            |      | 10   | 500  | μA    |
|                                  |                      |                                                                                     |      | 0.2  | 1.0  | mA    |
| Gate-source leakage current      | I <sub>GSS</sub>     | V <sub>GS</sub> =±16V V <sub>DS</sub> =0V                                           |      | 10   | 100  | nA    |
| Drain-source on-state resistance | R <sub>DS(on)</sub>  | I <sub>D</sub> =50A V <sub>GS</sub> =10V V <sub>GS</sub> =4V                        |      | 4.8  | 7.0  | mΩ    |
|                                  |                      | V <sub>GS</sub> =10V                                                                |      | 3.2  | 4.0  | mΩ    |
| Forward transconductance         | g <sub>fs</sub>      | I <sub>D</sub> =50A V <sub>DS</sub> =25V                                            | 45   | 90   |      | S     |
| Input capacitance                | C <sub>iss</sub>     | V <sub>DS</sub> =25V                                                                |      | 6600 | 9900 | pF    |
| Output capacitance               | C <sub>oss</sub>     | V <sub>GS</sub> =0V                                                                 |      | 3300 | 4950 |       |
| Reverse transfer capacitance     | C <sub>rss</sub>     | f=1MHz                                                                              |      | 1400 | 2100 |       |
| Turn-on time                     | t <sub>d(on)</sub>   | V <sub>CC</sub> =15V R <sub>G</sub> =10 Ω I <sub>D</sub> =100A V <sub>GS</sub> =10V |      | 20   | 30   | ns    |
|                                  | t <sub>r</sub>       |                                                                                     |      | 150  | 230  |       |
| Turn-off time                    | t <sub>d(off)</sub>  |                                                                                     |      | 470  | 710  |       |
|                                  | t <sub>f</sub>       |                                                                                     |      | 370  | 560  |       |
| Avalanche capability             | I <sub>AV</sub>      | L=100μH T <sub>ch</sub> =25°C                                                       | 100  |      |      | A     |
| Diode forward on-voltage         | V <sub>SD</sub>      | I <sub>F</sub> =100A V <sub>GS</sub> =0V T <sub>ch</sub> =25°C                      |      | 1.0  | 1.5  | V     |
| Reverse recovery time            | t <sub>rr</sub>      | I <sub>F</sub> =50A                                                                 |      | 95   |      | ns    |
| Reverse recovery charge          | Q <sub>rr</sub>      | -di/dt=100A/μs T <sub>ch</sub> =25°C                                                |      | 0.22 |      | μC    |

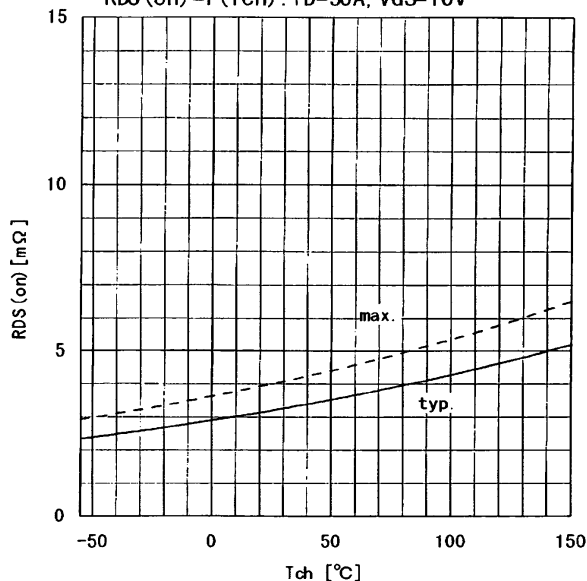
**● Thermal characteristics**

| Item               | Symbol                | Min. | Typ. | Max. | Units |
|--------------------|-----------------------|------|------|------|-------|
| Thermal resistance | R <sub>th(ch-c)</sub> |      |      | 0.83 | °C/W  |
|                    | R <sub>th(ch-a)</sub> |      |      | 35.0 | °C/W  |

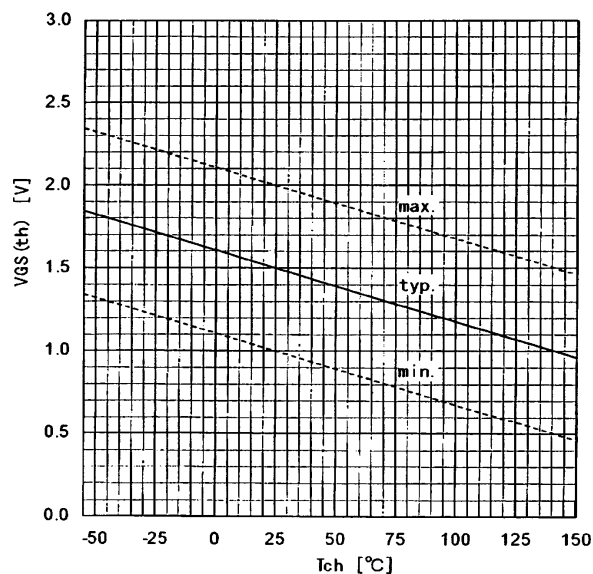
# Characteristics



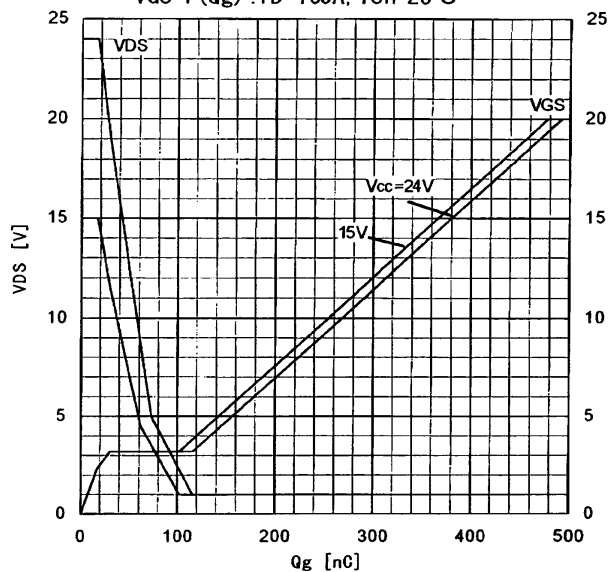
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_{ch}) : I_D = 50A, V_{GS} = 10V$



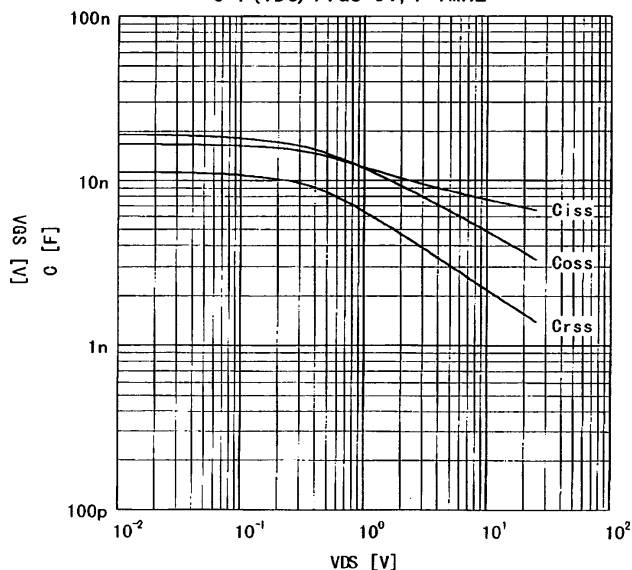
Gate Threshold Voltage vs.  $T_{ch}$   
 $V_{GS(th)} = f(T_{ch}) : V_{DS} = V_{GS}, I_D = 1mA$



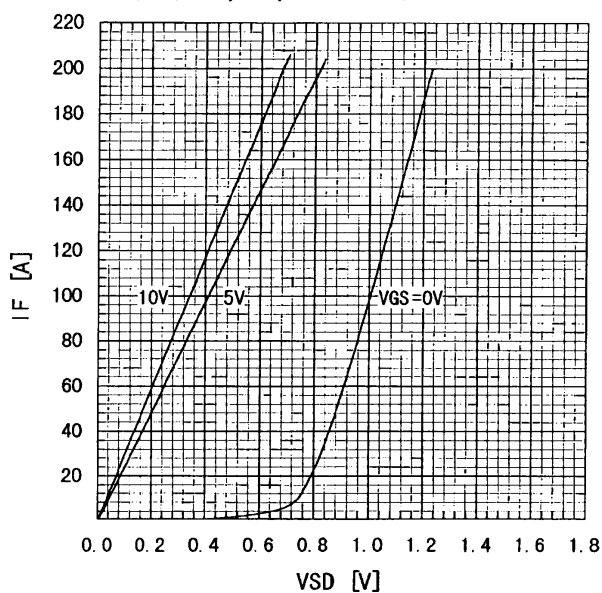
Typical Gate Charge Characteristics  
 $V_{GS} = f(Q_g) : I_D = 100A, T_{ch} = 25^{\circ}C$



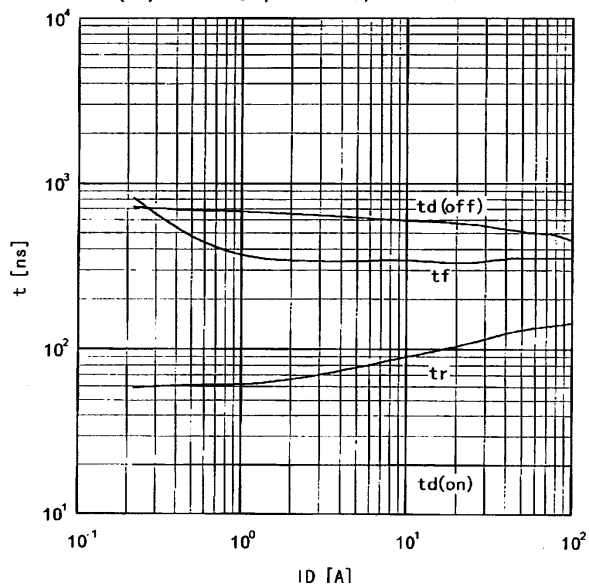
Typical capacitances  
 $C = f(V_{DS}) : V_{GS} = 0V, f = 1MHz$



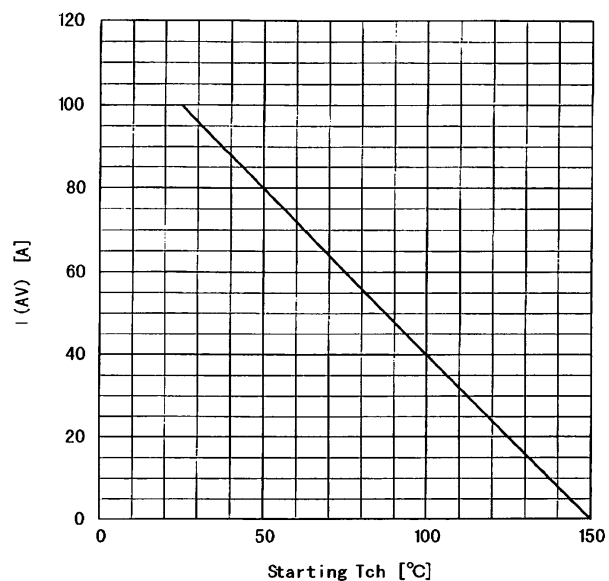
Typical Forward Characteristics of Reverse Diode  
 $I_F = f(V_{SD}) : 80\mu s \text{ pulse test}, T_{ch} = 25^{\circ}C$



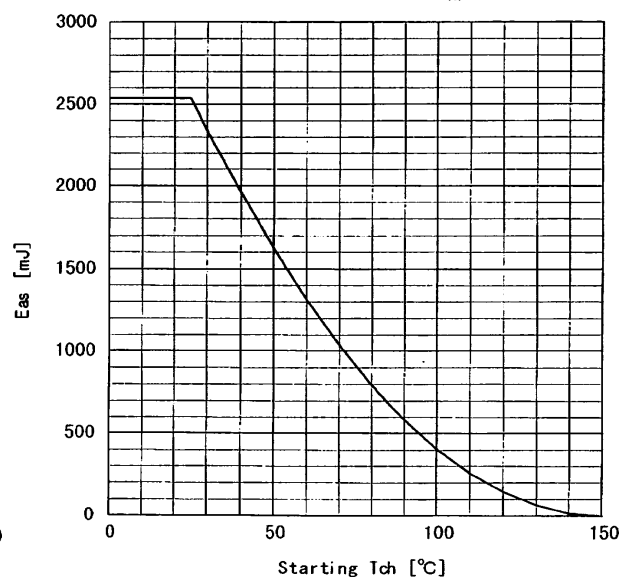
Typical Switching Characteristics vs.  $I_D$   
 $t = f(I_D) : V_{CC} = 15V, V_{GS} = 10V, R_G = 10\Omega$



Maximum Avalanche Current vs. starting Tch  
 $I_{AV} = f(\text{starting Tch})$



Maximum Avalanche energy vs. starting Tch  
 $E_{AS} = f(\text{starting Tch}) : V_{CC} = 12V, I_{AV} \leq 100A$



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

